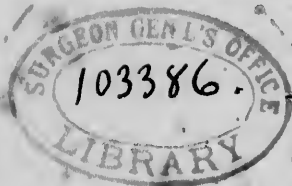


THE
DENTAL ART,
A
PRACTICAL TREATISE
ON
DENTAL SURGERY,
BY
CHAPIN A. HARRIS, M.D.

SURGEON DENTIST.

If then the teeth, designed for various use,
Decay and ache, 'tis only from abuse,
And lo, triumphant art can well ensure,
At least a remedy, if not a cure.

Brown's Dentologia.



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TO

THOMAS E. BOND, M. D.

AS A TOKEN OF GRATITUDE FOR MUCH KINDNESS, AND A TESTIMONY OF RESPECT AND ESTEEM FOR GREAT

PROFESSIONAL AND PRIVATE WORTH,

THIS VOLUME

IS RESPECTFULLY DEDICATED,

BY HIS FRIEND,

AND OBT SERV'T,

THE AUTHOR.

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P R E F A C E .

NOTWITHSTANDING the many able works on Dentistry which have already appeared, the author of the following pages, has, for a long time, thought that there was still wanting a treatise, that should possess a more practical character, especially as regards mechanical dentistry, than any that have hitherto been published in America. With a view of supplying, in some small degree, this deficiency, he has been induced to arrange in the present form, and submit to the attention of the profession, the information which he has derived from his own experience, or obtained from the most celebrated authors. How far it will prove useful, it is not for him, but for time and experience, to decide. That he has furnished all the information on the subject which is requisite, he has not the presumption to suppose, but if the present Treatise shall be found to contribute, in any degree, to facilitate the labors of the younger and more inexperienced parts of the profession, the object of its publication will have been fully accomplished.

With a view to this, he has sought, less with a reference to elegance than plainness, to impart a correct knowledge of the principles of the art. He has freely adopted the opinions of others, when they were found to accord with his own, and if on

any subject he has had occasion to differ from them, it has only been from a sincere conviction that they were in error. He is aware, that he, like them, is subject to error, and therefore, all that he can expect, is, that he should be candidly judged, after the arguments and facts that have been advanced to support his opinions shall have been impartially perused.

The anatomical information, which it is necessary for a practitioner of Dental Surgery to possess, the author thought could be much better obtained from almost every regular treatise on anatomy, than from such a treatise as the present volume professes to be. Believing, therefore, that the expense of the work would be much increased by the introduction of such matter, he determined to omit it, and hence the anatomy of the teeth is introduced, only so far as is actually necessary, in order to enable the reader fully to understand the subject of which he is treating.

Before he closes these prefatory remarks, there is one thing more for which he will claim the indulgence of his reader, and that is with reference to any inaccuracies or omissions that may be found in the text. During the greater portion of time that the work was going through the press, he was absent from the city, and consequently, he is aware that, although there may be few mistakes, which the general reader will detect, yet there may be many which will not escape the keenness of professional observation.

Baltimore, April 10th, 1839.

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THE DENTAL ART.

CHAPTER I.

ITS ORIGIN AND HISTORY—ITS ABUSES—THE DIFFERENT DEGREES OF IMPORTANCE ATTACHED TO THE HUMAN TEETH BY DIFFERENT PEOPLE.

THE Dental Art has generally been considered of modern date, and as intended rather to beautify the human face and countenance, than to prevent or cure any of the maladies to which the body is liable; it is, however, of a more ancient origin than is usually supposed, nor are the benefits it confers confined exclusively to the teeth. It existed at a remote period, but we cannot determine to what extent it was practiced, or how near perfection it was brought, since the ancient works, if ever there were any on this subject, either were involved in the destruction of the Alexandrian library, or were lost during the dark ages that succeeded. But, although we have no positive proofs that anciently there were any elaborate works on this subject, yet we can glean enough from the classic authors that remain, to establish its claim to antiquity.

The poet Martial informs us, that the insertion of artificial teeth was a very common practice among the Romans, and that those Roman ladies that had lost

their natural teeth, were in the habit of resorting to this means for the purpose of supplying those personal charms and attractions of which they had thus been deprived.

The custom of filling up the cavities of decayed teeth (commonly called plugging) originated in the first century of the Christian era. Celsus, who flourished at this period, is said to have been the first that recommended, and perhaps performed, this operation.

The disease of the teeth had, however, attracted considerable attention many centuries anterior to this, as may be seen from the writings of Herodotus, the Grecian historian. He informs us that the art of medicine is so practiced in Egypt, "that there is an individual healer for each individual distemper, and hence the whole country is filled with healers, some taking charge of the diseases of the head, others of those of the eyes, others those of the *teeth*, &c. &c.

Hippocrates, who lived several centuries after, describes the functions of the teeth, the periods at which they respectively appear, and also some of the disorders to which they are liable.

Among the other remaining fragments of the ancient records, we also find frequent allusions to this subject, so that we cannot doubt, that this branch of surgery was known and practiced at an early day. From the sixth to the eighteenth century, however, it was chiefly entrusted to the hands of menials, from whom it received but little improvement; and by whom its functions were exercised in the rudest and most barbarous manner.

It was, I believe, in the latter part of the fourteenth, or at the commencement of the fifteenth, century, that

the operation of transplanting a tooth from the mouth of one person into that of another, was first performed. This barbarous and cruel custom was, however, then soon abandoned; but, towards the latter part of the eighteenth century, it was revived by Mr. John Hunter, a celebrated English anatomist and physiologist, with whom it was thought, by many, to have first originated.

To say nothing of the danger to which this practice exposed the person, in whose mouth a tooth was thus inserted, taken freshly (as it must of necessity have been, in order to insure a union with the alveolus, in which it was placed) from the mouth of another, who, at that very time, might have been laboring under some infectious disease; it never, even under the most favorable circumstances, succeeded more than in one case out of three; and even then, the foreign tooth seldom failed to exercise a morbid influence upon the surrounding parts.

Of all the species of dental quackery, this, therefore, is certainly the most to be deprecated. Fortunately for humanity, and the credit of the present enlightened age, the practice has long been discontinued, and it is hoped will never more be renewed.

However much the anatomical and physiological researches of Mr. Hunter may have contributed to the improvement of the other branches of medical and surgical science, they certainly contributed but little, other than awakening a spirit of inquiry, to the advancement of the one now under consideration. The description he gives of the formation and growth of the human teeth, is better than any that was given, either at or before his time; but his views upon their structure, are

now universally admitted to be erroneous. He describes, with much accuracy, many of the diseases to which they are liable; but the respective plans of treatment recommended by him, indicate a great want of practical knowledge. This, however, must be attributed to the fact, that his opinions on this subject were founded more on speculation than on experience.

At the commencement of the eighteenth century, the art rose from the degraded condition in which it had so long lain; and from this period, its present improved and comparatively perfect state may date its commencement.

It had, by this time, attracted so much attention, that it was deemed worthy of being cultivated as a science, and accordingly a law was passed in Paris, requiring all those who intended to devote themselves to the performance of its duties, to undergo an examination before men appointed for the purpose; and that only such as were thereupon found qualified, should be allowed to practice. Had this salutary example been imitated in other countries, it would not only have prevented the frequent impositions that have been practised upon the public, by persons calling themselves dentists, but would also have added a character and respectability to the profession, to which it has, comparatively, seldom attained.

The French, and to their honor be it spoken, have done more to perfect this department of surgery than any other nation, and to them we are indebted for some of the greatest and most important of its improvements. But, while all due credit is awarded them, for the attention and care with which they have studied its principles—the ingenuity and talent, that

they have brought to its aid—the energy and zeal, with which they have applied themselves to its cultivation, and for the pre-eminent manner in which they have contributed to the development of its resources; it cannot be denied, that they have encumbered it with many superfluities, which have tended somewhat to retard its otherwise more rapid progress.

Several small works, on the anatomy, physiology, and diseases of the teeth, appeared previous to the eighteenth century, but there was not any regular practical treatise on the subject before 1728, at which time Fauchard published his “*Le Chirurgien Dentiste ou Traité des Dents*,” &c. &c. This eminent dentist enjoyed, during a practice of more than forty years, an enviable and deservedly high reputation. In the confused and imperfect state the art then was, he collected all that was known on the subject, with which, and the knowledge derived from his own experience, (which, by the way, was worth more than all that had hitherto been written,) he laid the foundation for the whole superstructure of modern dental surgery. He was a close and accurate observer, a quick genius, and possessed a mind capable of comprehending every thing upon which it was brought to bear, so that of him, and in reference to this subject especially, it may be said, *nihil quod tetigit non ornavit*.

From this time, the dental art advanced more rapidly; every year added to the number of its practitioners, developed its resources, and increased its utility, so that it soon rose in the estimation of the world, and assumed a character more commensurate with its value, than any that had hitherto been attached to it.

Many works of various degrees of merit have since been written on the subject. Some of them explain its principles in a clear and lucid manner, being the result of deep and extensive research, and of long and accurate observation; but very many others, instead of communicating improvements or new discoveries, or giving any additional information, carefully conceal all that was previously known; and thus indirectly announce that the mode of practice pursued by their respective authors, is superior to that of any of their brethren, and peculiar to themselves alone.

Few, therefore, of the many volumes that have been written, contain much useful information for the practitioner; and hence, if he be not fortunate in the selection of his books, he will be deprived of the experience of those that would have been of service to him, as guides in the performance of his professional duties.

M. Audibran informs us, in his *Historique et pratique sur les Dents artificielles incorruptibles*, &c. that Fauchard, as early as 1728, had recommended the manufacture of incorruptible teeth. But it is quite uncertain whether his recommendation was followed, since we hear nothing more of them until 1776, when, as we are told by the same author, they were manufactured by Duchateau, an apothecary of St. Germain. They were afterwards made by M. Dubois Chement, M. Dubois Faucau, M. Fonsi, and others. The Parisian Athenæum of Arts, in 1808, awarded a crown and medal to M. Fonsi, for some improvement made by him in the composition of these teeth.

The porcelain teeth were not, until quite recently, favorably received; but the great improvements that

have been made in their manufacture, within the last five or six years, have obtained for them a decided preference over every other kind that have hitherto been used.

Whole sets of artificial teeth were first inserted by Bourdet, about the middle of the eighteenth century, but on account of the awkward and clumsy manner in which they were arranged and confined in the mouth, it was a long time before they came into common use.

The improvements, however, that have since been made in this department of dental surgery are such, that whole sets are now not only used with comfort and satisfaction, but are also made to subserve most of the purposes for which the natural organs were designed.

ITS ABUSES.

Confided, as this branch of surgery always has been, in almost every country, to the hands of whoever seemed disposed to attempt the exercise of its intricate duties, it is not to be wondered, that it should have frequently fallen into obloquy and disrepute. But how much soever it may have suffered from this cause, its utility is not the less great, and we can only regret that public opinion has not been sufficiently awakened to its importance to defend it from the impositions of pretending empirics.

It is a remarkable and humiliating fact, that though dental surgery was never better understood, yet its principles were never more erroneously practiced and shamefully abused, than they are at the present day. It may now be said to have attained its greatest perfection; but

while there are many that have carefully studied its principles, and devoted themselves with zeal and integrity to its practice, there are others, actuated by less praiseworthy motives, that have attempted to discharge its duties without possessing any of the necessary preparatory qualifications, and, in consequence, many injuries have resulted from their operations.

On this subject, there exists an absurdly erroneous opinion, which is fraught with dangerous consequences. It is supposed by many, that mere mechanical tact is all that is necessary to the practice of dental surgery. This, it is true, is essentially requisite, but there are other qualifications equally important, without which it is impossible to treat, with success, the diseases that come within the legitimate province of the art.

No matter how great may be a man's mechanical ingenuity, he cannot follow out the curative indications of the various diseases to which the teeth are liable, unless he be at the same time acquainted with the anatomy and physiology of the teeth, and of the parts connected with them, as well as with the pathology of their several morbid conditions, and the science of disease in general.

On the other hand, a person may understand the theory, but not be a good practitioner, for all cannot successfully practice what they understand. It is, therefore, only by the union of the general principles of medicine, and mechanical tact, that one can become well skilled in this part of surgery.

M. Delabarre says, "That it is by the union of the various branches of knowledge, which result from the study of medical science and the manual arts, that

he who is engaged in dental surgery can hope to render real service to mankind."

M. Audibran remarks: "That it is an art that at the same time partakes of the nature of surgery and medicine." Consequently, those who practice it, should understand the principles of both.

By this, we mean not to assert that a man cannot be a good dentist without having first gone through a regular course of medicine, but that a general knowledge of the doctrines of disease is necessary to a thorough acquaintance with all the principles of this profession; for it often happens that as much sound practical judgment and experience is necessary in the treatment of dental diseases, as in that of many of the disorders to which the general system is exposed.

The teeth differ from other parts of the body in many particulars. They are more dense and less vascular in their structure, and unlike any other part of the system, they are not endowed with healing or restorative powers; and hence, that branch of surgery, within whose province the treatment of their diseases comes, demands more than mediocrity in its practice.

The imperfections, therefore, in the operations of the dentist, are never made up by any *vis medicatrix naturæ* of these organs; but, on the contrary, when such occur, they seldom fail to increase the evils they were intended to remedy.

But while there are thousands who can, from experience, bear ample testimony to the advantages resulting from judiciously advised and skilfully conducted dental operations, there are also many others who, induced perhaps by some flaming advertisement, have

submitted themselves to the operations of its author, but have found, when too late, that instead of realizing the benefits they expected, they have sustained an irreparable injury.

Painful and humiliating as such abuses, in any of the departments of the medical or surgical profession, must be, to the respectable part of its members, yet the fact, that such abuses do exist in the practice of dentistry, has become so notorious, and so much mischief and opprobrium have hence resulted, that I feel myself bound to say a few words in the defence of this branch, the exercise of whose functions have now engaged my undivided attention for more than twelve years.

Mal-practices have probably been more frequent in this, than in any other part of medicine or surgery, and must, without doubt, be attributed to the fact, that there never has been a law, in this or any other country, except France, to prevent or restrain whoever wished to practice it, from so doing. Consequently, on account of the facility with which a superficial knowledge of some of its principles may be obtained, the supposed emolument arising from its practice, and the want of better employment, many have resorted to it as a means of support; and thus, the unsuspecting and credulous have often become the dupes of their pretensions.

The remarks of Fauchard upon the state of the profession in France, anterior to the eighteenth century, are somewhat applicable at the present day. He says: "The most celebrated surgeons, having abandoned this branch of surgery, or having but little cultivated it, their negligence has given rise to a class of persons who, without theoretic knowledge, without experience,

and without being at all qualified, practice it at hazard, having neither principles nor system."

Some excuse might have been found for such abuses at that early period, but that they should be tolerated now, is a reproach both to science and the present enlightened age. But while that apathy, which has prevailed in reference to this subject, still exists, we must expect to experience those evils that result from the common want of a scientific knowledge of its principles.

The diseases that it professes to cure, it is true, are not so immediately deleterious to the functional operations of the general system, as many, to which the physical structure of man is liable; but its resources, during the last fifteen or twenty years, have been almost as frequently called into requisition as those belonging to any of the other branches of the medical or surgical profession; and, if it does not exercise so powerful an influence over the common enemy of human life as they, it often plucks from the system the slowly germinating seeds of many a more lurking and perhaps not less fatal disease.

Still it has never been recognized or taught in any of the schools of medicine, as a regular branch of the healing art, nor have any institutions been reared by science-fostering communities for the diffusion of a correct knowledge of its principles, the suppression of its abuses, and the protection of its privileges. But although it has had to urge its way through discouraging circumstances like these, unprotected by legislative enactments, and unadorned with collegiate honors, yet it has, in a measure, surmounted every difficulty, and if it has not outstripped its sister branches, it has, at

least for the last half century, kept even pace with them.

The want of success in the treatment of dental diseases is not, however, always attributable to a want of knowledge or skill on the part of the practitioner. There are, sometimes, circumstances connected with them, over which he can have little or no control; and he is, at other times, so restricted in his operations by his patient, that he is unable to bestow those benefits which he might otherwise confer. Although, in such cases, he should, of right, be exempt from all responsibility, yet, when it is found that the evils that he was required to remedy still exist, he is often not only censured for not having prevented their continuance, but is even sometimes accused of having produced them.

Were there any means, by which the merits of the practitioners and candidates for the practice of dental surgery could be ascertained, we should seldom hear the complaints that are now made of its abuses, and an entire confidence in its utility would pervade the minds of all. This can only be obtained by the adoption of measures similar to those that were adopted by France in 1700.

The MEDICO CHIRURGICAL FACULTY of this state, by virtue of certain legislative enactments, regulating the practice of surgery and medicine, have, it is true, authorised their board of examiners to examine applicants on this branch, and to grant licenses to such as they may deem qualified to practice; but, as dental surgery constitutes no part of the studies of the student of medicine, these examinations must, of necessity, be limited in their character, and confined to a few general

principles. We do not know that there is any law that requires even this. If there is, its requisitions are very seldom complied with, so that it is, in effect, null and void.

A regulation of this sort would not only prevent impositions upon society, but would also do away that selfish and mercenary spirit of rivalry which too often exists among the profession. It would more frequently enlist talent in the cultivation of this branch of useful knowledge, induce a more general spirit of inquiry, and save the respectable part of the profession from the unjust imputations under which they, on account of their less worthy brethren, so frequently labor.

If the practitioners of dentistry would associate as freely and unreservedly with each other, as the practitioners of medicine and surgery usually do, much good would thereby result to all; every one would then have an opportunity of communicating his views and experience on the subject to others; and thus all, in turn, might derive much profit.

While, therefore, we would deprecate empiricism of every kind, in all the departments of the profession, we do not think the services of the skilful dentist can be too highly prized, since, if timely rendered, they are capable not only of preventing all the unpleasant effects arising from imperfectly formed, badly arranged, and diseased teeth, and their unhealthy involucres, but also, in many instances, of preserving these invaluable organs through life.

THE DIFFERENT DEGREES OF IMPORTANCE ATTACHED
TO THE HUMAN TEETH, BY DIFFERENT PEOPLE.

In every age and country, even among the rudest and most barbarous nations, these useful and beautiful organs have attracted attention, and been regarded as being of great importance for the purpose of giving symmetry and beauty to the face.

The most important business of the teeth is the comminution of food. This is a preparatory process indispensable to a quick and easy digestion; and hence, the loss of these organs in brutes is soon followed by death; but in man, it may, to a considerable extent, be repaired; so that, although the teeth are essential to comfort and perfect health, they are not absolutely necessary to human life, notwithstanding the doctrine taught by Niccepporus would seem otherwise to imply. They are also essential to the modulation of the voice and to a distinct enunciation of language; and hence, when one or more of them is lost, much inconvenience in articulation is often experienced.

Lord Chesterfield says: "That fine and clean teeth are among the first recommendations to be met with in the common intercourse of society." Lavater remarks, "That the countenance is the theatre on which the soul exhibits itself," and adds, "as are the teeth of man, so is his taste."

The following beautiful extract is taken from the French Dictionary of Medical Sciences, vol. 8, p. p. 329, 330. "The teeth are the finest ornament of the human countenance. Their *regularity* and *white-*

ness constitute its chief attraction. If the mouth exceeds its ordinary size, fine teeth serve to disguise this defect of conformation; and the illusion that results from the perfection of their arrangement, is often such, that we imagine that it would not have appeared so well even had it been smaller. Observe that lady smile, whose mouth discloses the perfection of their arrangement. You never think of noticing the extent of the diameter of her mouth. All your attention is fixed upon the beauty of her teeth and the gracious smiles that so generously expose them."

"These ornaments are equally attractive in both sexes. They distinguish the elegant, from the slovenly gentleman, and, by softening the features, diffuse amiability over the whole countenance. Even the face of the black African, when he smilingly shows his sparkling teeth, ceases to frighten the timid beauty."

"Fine teeth are more especially necessary to woman, for it is her destiny, first to gratify our eyes, before she touches our souls and captivates our hearts. The influence that the teeth exercise in the production of beauty, justifies the pre-eminence that I have assigned them, over all the other attractions of the face. Let a woman have fine eyes, a pretty mouth, a handsome nose, a well turned forehead, elegant hair, and a charming complexion, but only let her teeth be bad, blackened by caries, or covered with thick tartar or viscid concretions, let her, in a word, exhale a contaminated breath, and the moment she opens her mouth, she will cease to be thought beautiful. If she, on the contrary, has small eyes, or a large nose, and is even positively ugly, yet if her teeth are regularly planted, white, and above all, entire,

(or at least those of them that are visible,) she, however frightful she may be, will appear agreeable the moment a smile comes to her aid, and will hear those words whispered around her that are so consoling to her vanity, 'Ah, what beautiful teeth she possesses.' "

"Whenever nature, that is sometimes sparing of her gifts, has failed to bestow them on the teeth, and has made them defective in form, and tarnished in color, great care and cleanliness should be used in order to hide these imperfections and faults. For then, if the teeth do not attract our regard, they will not, at least, affect us with disgust."

Lavater, the learned physiognomist, regarded the shape, size, and arrangement of the teeth, as indexes to the qualities and disposition of the mind, as well as to the physical powers of the body.* "White, clean, and well arranged teeth, visible as soon as the mouth opens, but not projecting, nor always entirely seen, I have never met with," says he, "except in good, acute, honest, candid, and faithful men." Again he remarks: That short, broad teeth, standing close to each other, show tranquil, firm strength; and, that melancholy persons seldom have well arranged, clean, and white teeth.

He proceeds in this manner to assign qualities to the body and mind, according to the shape, appearance, and position of the teeth. To support his theory, he even goes to the brute creation, and, taking the river horse as an example, remarks: "How stupidly savage and inexorable, how irregular are the position and figure of the teeth. How peculiar the character of satanic, but foolish, self-destructive malignity."

* Fitch's Dental Surgery.

Lavater may have been a good physiognomist, but he certainly must have been ignorant of the physiology of the formation and growth of the human teeth, or he never would have regarded them as indicating the qualities either of the body or mind; for the physical structure and appearance of these organs, are so much influenced by the condition of the system at the time of their production, that persons of directly opposite characters, frequently have teeth entirely alike.

How much soever there may be in the face to indicate the character of the mind, and the powers of the body, there is certainly nothing of the kind in the teeth; for good and bad teeth are alike common to the most hardy, robust, and athletic, and to the weakest and most effeminate—to those of the highest grade of intellect, and the simplest idiots—to persons of the strongest and most ungovernable passions, and to those of the mildest and most amiable dispositions.

Regular, well formed, and white teeth, were, by the ancients, considered as characteristics of beauty, as may be seen from the following extracts: Jacob, in blessing Judah, says, "His teeth shall be white with milk." Solomon, in describing the church of God, compares it to a beautiful woman; and, after setting forth her graces in such language as immediately brings to the mind's eye, her whom Milton has described as being the fairest of her daughters, uses the following simile: "Her teeth are like a flock of sheep that are even shorn, which came up from the washing whereof, every one bear twins." The Hebrews considered the loss of these organs as a grievous and somewhat disgraceful circumstance. Thus David uses this emphatic language: "O

God, thou hast smitten all mine enemies on the cheek bone; thou hast broken out the teeth of the ungodly." Again, he prays thus against the wicked judges, "Break out their teeth, O God, in their mouth." Many such passages may be met with in the book of inspiration, but we have quoted enough to show, that even in these very early days, much importance was attached to the teeth.

Mr. Joseph Murphy, in his *Natural History of the Human Teeth*, informs us, that "the natives of Hindostan, the Bramins in particular, are extremely delicate in every point relating to their teeth. Every morning, when they rise, they rub them for upwards of an hour with a twig of a racemiferous fig tree, at the same time addressing their prayers to the sun, and calling down the blessings of heaven on themselves and their families. As this practice is prescribed in their most ancient books of law and divinity, we imagine it coeval with the date of their religion and government. It exhibits a curious proof of the regard, which this polished and scientific people had for the purity and beauty of the mouth, when so simple a practice is inculcated as a law, and rendered indispensable as a religious duty."

The Bramins are said to have finer teeth than any other people in the world; this is, without doubt, in a great measure, to be attributed to the attention that they pay to their cleanliness. These people, also, separate their teeth with a file, as soon as the second sets are perfectly formed, but we cannot determine whether this be for the purpose of preventing decay, or of adding to their beauty.

There is a variety of customs among many of the inhabitants of India and the islands of the Pacific, which shows of how much importance these people consider their teeth.

The inhabitants of Tonquin and Siam, dye their teeth black, as also do the females of the Marian islands, and the unmarried ladies of Java.

Many of the women of Sumatra have their teeth filed down to their gums; others again, either have them filed down to points, or the enamel and extremities filed off, in order that they may the more easily be dyed black; which color is regarded as being very ornamental. The great men of these islands color their upper teeth black, and encase their lower ones in gold, which is said to make a beautiful contrast by candle light. The inhabitants of some of the other East India islands, gild their two front teeth, and dye the others black.

The natives of Malacca grind horizontal grooves across the surface of their upper incisors. The Abyssynian negroes file their teeth to points, and thus increase the savageness of their aspect.

In India, white teeth were formerly considered as ornamental to the face, as may be seen from the writings of their poets. "The lover," says Mr. Murphy, "in enumerating the charms of his mistress, never fails to notice, as a principal attraction, the whiteness and regularity of her teeth."

Catullus, in describing the beauty of Panthea, alludes to her white, even, and well arranged teeth, and compares them to a sparkling necklace of the most beautiful and brilliant pearls.

Ovid also seems to have thought that white teeth were very attractive; for, in addressing a beautiful lady, he remarks: "I can perceive your attention to the graces by the whiteness of your teeth."

The inhabitants of Prince William's Sound, we are informed by Mr. Murphy, "make an incision in the upper lip, parallel with the mouth, sufficiently large to admit the tongue through. When the sides of the incision are healed, they have much the appearance of lips. In this artificial mouth they wear a shell, which is cut to resemble a row of teeth."

The natives of the Sandwich Islands, in order to propitiate their god, Eatooa, offer up to him their front teeth, thus indicating the estimation in which they hold them.

We shall make no apology for thus dilating on this point, since, whatever relates in any way to the teeth, ought not to be uninteresting and unimportant to the student of dentistry.

CHAPTER II.

THE EFFECTS OF DISEASED TEETH, GUMS, &c. ON THE
FUNCTIONAL OPERATIONS OF OTHER PARTS OF THE
BODY.

IF we consider the mutual dependencies that subsist between the teeth and the other parts of the body, it will not appear wonderful, that when these organs are impaired by decay, other parts of the system should, in consequence, suffer a corresponding derangement. It is, indeed, a law of the animal economy, that one organ should sympathise with another, and, in fact, it often happens that the organ or part sympathetically affected, assumes a severer and more aggravated form of disease than the one idiopathically or primarily attacked. With this organ, other parts again sympathise, and thus it sometimes proceeds, until the whole system becomes implicated in one general and complicated disease.

When we consider, that the *dental* nerves are derived from those that are usually denominated the *superior* and *inferior maxillary*, which are the *second* and *third branches* of the *fifth pair*, we immediately perceive the intimate connection that exists between the teeth and almost every other part of the body. We, at once, discover, that they are, by the union of the *pterygoid*

branch of the *superior maxillary*, with the first cervical ganglion of the *great sympathetic* or intercostal nerve, connected with almost every viscus in the chest and abdomen.

We shall not, however, here enter upon a minute description of these ramifications, for, to the physician it would be unnecessary, and to one unacquainted with medicine, useless and uninteresting. Suffice it to say, that a knowledge of these distributions will enable us satisfactorily to account for many of the remote and deleterious effects that often arise from the diseases of the teeth and of their involucre.

But the diseases of the teeth, and of the parts within which they are contained, although their nervous associations are numerous, frequently exercise an influence other than that of morbid sympathy, which is highly injurious to the system.

These organs were designed, by an all-wise and beneficent Providence, for important purposes, and it is necessary to the well being of the body, that they should perform the offices allotted them in a perfect and healthy manner. Mastication appears to be the most important of these functions, and will therefore more particularly receive our attention at the present time.

By this process, the food is comminuted and mixed with the saliva of the mouth, and is thus prepared for those changes that it is destined afterwards to undergo. But when the teeth become incapable of performing this function, the aliments are taken into the stomach in an improper state, digestion is slow and laborious, and a double duty is thus imposed upon the digestive and

assimilative organs, which, of necessity, must tend to weaken their powers and hasten their destruction.

It should also be recollected, that while the aliments are being thus triturated, they are penetrated by the secretions of the mouth; which, by destroying the cohesion of their particles, reduces them to a pultaceous mass, and thus fits them for deglutition.

On the mastication of the aliments and their mixture with the fluids of the mouth, Magendie proposes the following interrogatories: "Of what use is the trituration of the food and its mixture with the saliva? Is it a simple division which renders the aliments more proper for the alterations that they undergo in the stomach, or do they suffer the first degree of animalization in the mouth?"

Although Magendie confesses that he cannot satisfactorily answer these interrogatories, yet he soon after remarks, "that mastication and insalivation change the savor and odor of the food—that mastication, sufficiently prolonged, generally renders digestion more quick and easy—that, on the contrary, people who do not chew their food, have often, on this account, very painful and slow digestion." He thus admits the importance of the masticatory process, though he cannot tell all the changes that it produces in the food.

Many physiologists suppose that animalization commences in the mouth, and Magendie himself observes of the saliva, "that it is one of the most useful digestive fluids—is favorable to the maceration and division of the food—and assists its deglutition and conversion into chyme."

This, however, is an abstract physiological question,

with which we, at present, have but little to do; our object being merely to show the importance of the process, to the healthy operations of other parts of the system. All must admit that the trituration of the food and its mixture with the salivary and mucous secretions of the mouth, are indispensable to a proper digestion. It is, therefore, necessary, not only that the aliments should be well comminuted before they pass into the stomach, but also that the fluids of the mouth, with which they are, during this process, penetrated, should be in a healthy state. But decayed and loose teeth, dead roots, turgescient and ulcerated gums, and accumulations of salivary calculus, often render these liquids not only acrid and irritating to the mouth, but even nauseating to the stomach.

These fluids, in a healthy state, so far from being injurious to the teeth, are essential to their health and preservation; but when they have once become vitiated, they often cause their decay, and sometimes even corrode their outer crystalline coverings.

It has been remarked by several distinguished physiologists, among whom are Richerand and Magendie, that the salivary fluid has a strong affinity for oxygen; that it readily absorbs it from the air, and readily parts with it to other bodies, so that silver, and even gold, are sometimes oxydized by it. My own observations on this subject, lead me to believe, that healthy saliva will not produce such an effect on gold. It has, to my knowledge, been worn in the mouth for twenty, thirty, and even forty years, without ever having become the least oxydated. In other cases, it has become tarnished in a few days, and in several instances, in

forty-eight hours. As the secretions of the mouth become more vitiated, they become more viscid, and as their viscosity increases, so does their affinity for oxygen, and hence the frequent oxydization of gold by the secretions of the mouth.

There are, moreover, other ways besides those just mentioned, in which diseased teeth impair the general health. The putrid and offensive matter that is thrown off by decayed teeth, and turgescient and ulcerated gums, imparts to the air that passes to and from the lungs a most disgusting odor, which is sometimes so great as to contaminate the atmosphere of a large room, and render it exceedingly unpleasant for any one, except the person affected, to respire it.

This state of the breath, although it may sometimes be the result of other causes, is a natural and almost inevitable consequence of carious teeth and diseased gums, and, without doubt, frequently occasions, especially in persons of a phthisical habit, very serious affections of the lungs.

Dr. Fitch, on this subject, remarks: "That nature has formed the lungs most delicate and sensible, and susceptible to the slightest injurious impressions. She has also finely tempered the atmosphere for its safe and healthy reception in these delicate organs; but art, accident, or disease may render it impure, unfit for respiration, and cause it, instead of harmonizing with the lungs in the most perfect manner, and giving to them and the whole system health and strength, to be a baneful influence, armed with pestilence, and scattering the seeds of disease over the lungs, and pouring the streams of deadly poison through every vein in the system."

Nor is it at all wonderful that the constant inhaling of an impure atmosphere should be deleterious to the lungs; since the poisonous matter with which it is charged, is brought in contact with them at every inspiration.

There are many circumstances connected with diseases that are difficult to explain, but there are certain general laws, which, though subject to many variations, will usually serve as guides to the practitioner, in ascertaining the proper curative indications. The same effects do not always follow the same causes. Much depends on constitutional tendencies and the susceptibility of different organs to morbid influences; so that what, in one person, would very soon produce serious, and perhaps fatal results, might, in another, make little or no impression. And it is thus that we account for the different manners in which teeth, in a state of disease, affect different individuals.

But, it may be asked, if a morbid condition of these organs has so great a tendency to impair the health of other parts of the body, why have they not more frequently attracted the attention of medical writers? It is, because the diseases of the teeth have always been considered as coming exclusively within the province of the dentist. A few medical authors, it is true, have adverted to their agency in the production of other diseases—the correctness of whose observations must carry with them the conviction of their truth.

Dr. Rush observes: “When we consider how often the teeth, when decayed, are exposed to irritation from hot and cold drinks, and aliments, and from pressure by mortification, and from cold air, and how intricate

the connection of the mouth is with the whole system, I am disposed to believe they are often unsuspected causes of general, and particularly of nervous, diseases. When we add to the list of these diseases, the morbid effects of the acrid and putrid matters which are sometimes discharged from carious teeth, or from ulcers in the gums, created by them, also the influence which both have in preventing perfect mastication, and the connection of that animal function with good health, I cannot help thinking that our success in the treatment of all chronic diseases would be very much promoted by directing our inquiries into the state of the teeth in sick people, and by advising their extraction in every case in which they are decayed." *

The influence of diseased teeth on the stomach, and other parts of the system, was noticed by Baglivi, as early as the commencement of the eighteenth century, who, in his *Canones Medicinæ*, remarks, "Persons, whose teeth are in an unclean and viscid state, though daily washed, have uniformly a weak stomach, bad digestion, and offensive breath, head-ache after meals, generally bad health, and low spirits. If engaged in business or study, they are impatient, and are often seized with dizziness." †

Physicians of the present day are beginning to pay more attention to this subject than those of a former period. They have discovered that many of the local and constitutional affections of the body are sometimes produced by an unhealthy condition of the teeth, and that they cannot be removed without first restoring

* Medical Enquiries, vol. 1, p. 201.

† Georgii Baglivi Opera, 1710.

these organs to health. Some time ago, an eminent physician of this city informed me that he had frequently observed the deleterious effects of diseased teeth, and that in chronic and nervous affections, he always examined these organs, and if he found them to be diseased, directed the patient to the dentist, whose remedial agents alone, had, in several instances, been sufficient to restore the general health. Several other medical gentlemen have favored me with their views on this subject, which perfectly agree with that here stated.

If it be true, that the "main-spring in the cure of disease, is the subduction of its causes," as a late medical writer observes, and if the diseases of the teeth, gums, &c. exert a morbid influence on other parts of the body, then it is essential that these should be perfectly understood, and that in the treatment of those disorders that are produced by them, such remedies should be applied as will tend most effectually to their removal. Unless this be effected, the efforts of the physician, although they may for a time arrest the progress of such diseases, will, in the end, prove unsuccessful.

Having thus briefly adverted to the effects of dental diseases on the system, I will now present a few simple facts in support of what has been here advanced.

In May, 1834, Mrs. —, a lady of this city, and of high respectability, was advised by her family physician to consult me in relation to her teeth.

Her health at this time was very delicate and precarious, and had been so for six years previously. She had taken much medicine, and had visited the Saratoga

and White Sulphur Springs, but without obtaining any permanent relief. Her stomach was so much disordered, that the lightest kinds of food, produced, for several hours after it had been taken, a heavy, burning, and very painful sensation. Her whole nervous system was so completely deranged, that the quick slamming of a door, or any other sudden noise, would almost throw her into convulsions. Her eyesight was much affected, and her head was affected with an almost constant swimming, or dizziness. On examining her mouth, I found that the crowns of the superior incisors, cuspidati and bicuspides, the inferior molares, a bicuspid on the right, and a dens sapientiæ on the left side of the lower jaw, were involved in general and complicated caries. Their alveolar processes were more or less absorbed, the gums tumefied, soft, spongy, and ulcerated along their edges. The inner surface of the inferior incisors, and the outer surface of the superior molares, were thickly coated with tartar, and the salivary and mucous secretions of the mouth in a viscid state.

At the earnest request of her friends, she submitted to the necessary treatment; by which the health of her mouth was completely restored, and with it that of her general system also. I do not mention this case on account of any peculiarity it possesses, but simply because it first occurred to my mind. When, in addition to the result of the treatment, I state, that she enjoyed almost uninterrupted good health until her teeth became diseased, I think it will not be doubted that her illness was occasioned by a morbid condition of the organs of mastication.

In September, 1830, I was consulted by Mr. —, at that time a resident of New York. Before I examined his teeth, he informed me that his general health had for four or five years past been very bad, and that he applied to some of the most eminent physicians of New York, Troy, and Albany, but could not obtain any permanent relief from his sufferings.

The character of the symptoms that were at this time manifested, was very peculiar. His digestive organs were so much deranged, that he was obliged to observe the strictest regimen, and confine himself to the simplest kinds of vegetable food. Besides the dyspeptic affection with which he was troubled, he had severe periodical paroxysms of headache and vomiting, that recurred at regular intervals of from four to five weeks. These were always preceded by a numbness, that commenced first in his tongue, and thence extended throughout the whole system. This sensation generally continued for about two hours, when it was succeeded by a violent pain in the head and partial vertigo, from which, in about ten hours afterwards, he was relieved by vomiting. The effects of these fits lasted for about ten days, and the other symptoms had continued, without much mitigation, for three years.

On examining his mouth, I gave it as my opinion, that the diseased state in which I found his teeth was the cause of his affliction. This idea, though perfectly novel to him, he was disposed to believe to be correct, and therefore the more readily consented to the treatment I prescribed. Many of his teeth were much decayed, and nearly all of them were covered with tartar.

The roots of some were denuded of the gum—the alveolar processes more or less absorbed—the gums turgescent, fungoid, bleeding on the slightest touch, and of a dark red color—the secretions of the mouth viscid, and their exhalations exceedingly offensive.

Such of his teeth, as could not be perfectly restored, were extracted; and as much of the tartar as could be conveniently, was, at the same time, removed from those that remained, and the rest taken away at subsequent sittings. His gums were freely scarified, and a tonic astringent and detergent wash directed to be used three or four times every day. Under this treatment, the local affection of the mouth rapidly disappeared, and in about four or five weeks his teeth and gums became perfectly healthy. His general health also began to improve, and, in about two months, it was perfectly restored; and thus it has continued ever since.

These two cases, I think, are sufficient to show the injurious influences that diseased teeth may exercise over other parts of the body.

The following communication has been kindly furnished me by Dr. S——, a distinguished surgeon and physician, of Hanover county, Virginia.

“Sir,—Mr. Abernethy has written a sensible and useful book on ‘The Constitutional Origin of Local Diseases,’ and he might have written another, equally valuable, on the *local origin of constitutional diseases*. He has sustained his views of the former by citing a number of interesting cases, and if any one doubts the existence of the latter, let him read the following; not for its novelty—for surgeons often witness such cases—but

as one of the simplest and most palpable of those instances of constitutional disease that arise from local irritation.

“A man by the name of Smith, twenty-three years of age, of sound constitution and valid health, accidentally struck the blade of a thin axe through the patella into the knee joint. Notwithstanding every precaution, a fever sprung up, attended with great constitutional disturbance. The joint suppurated, the fever assumed the hectic character, and reduced the patient so rapidly, that, when the limb was amputated some weeks after the accident, he was nearly a skeleton, and presented all the worst and most disgusting symptoms of pulmonary consumption, except, indeed, that the local disorder was at the knee joint instead of the lungs.

“The local affection was removed under the most discouraging circumstances, for, at the time I was called on to amputate the limb, there was reason to fear that he was too much reduced to survive the operation; but he afterwards rapidly recovered his health. This case is too plain to need any commentary. Such facts establish, beyond doubt, that constitutional disorder is often produced by local irritation; and we may presume, that it will be more or less severe, according to the character and extent of irritation; hence, it is fair to infer, that the general and local disease most commonly aggravate each other, and that, if the latter be removed, the health of the patient will generally be restored.

“I have given you below, two cases of disease from irritation consequent on bad teeth, the one of a troublesome and long continued constitutional disturbance; and the other of a local disease, affecting first the mem-

braneous structure about the faulty tooth, then the *antrum maxillare* and the bones that constitute the basis of the cranium, and finally the brain itself. Its termination was, of course, fatal.

"CASE 1st. Mrs. S——, a lady of 30 or 35 years of age, with several children, in easy circumstances, rather delicate, and of sedentary habits, complained of derangement in the functions of the digestive organs, with much nervous disorder, and a painful sensation about the head, as if there were a pound weight on the top of it, with an occasional tightening of the scalp. This last sensation she compared to that which might be expected from having the scalp forcibly drawn together on the vertex, by the clawing of some animal with talons, as a hawk or falcon.

"Her friends, at first, thought but little of her complaints, and from their eccentricity, were inclined to believe them, for the most part, imaginary. The affection of the head, however, and the sensitiveness of the nervous system, evidently increased, until they became so harrassing and acute that they deprived her of rest, and made manifest inroads upon her healthful appearance. Medical advice having been now obtained, a regular and carefully directed course of purgatives was prescribed, but with little or no advantage. The cathartics having been discontinued, the rubigo ferri, bark valerian, mineral acids, zinc, assafoetida, &c. &c. were next tried, to which were added frictions and tepid salt baths; but still without any material amendment.

"She began to have evident exacerbations of fever towards evening, which passed off with copious and debilitating sweats that much reduced her, and caused

her countenance to assume a sickly aspect. She visited the watering places in the mountains of Virginia, but although her strength was somewhat recruited, the distressing symptoms, with some slight modifications, still continued. She was occasionally confined to the house, but generally able to take some slight exercise in the open air. This state of things had continued for eighteen months, when the attention of her physician was called to an abscess formed near the root of one of her incisor teeth. This brought about an inquiry into the general state of her teeth, of which the following is the result:

“Mrs. S——, at an early period, had bad teeth, which, since her marriage, had gradually been growing worse. A few years before the time of which I speak, two of the incisors of the upper jaw were clipt off close to the sockets, and artificial teeth were inserted in the usual way, on the fangs. Much pain, irritation, and swelling of the gums and lips followed the operation, and similar symptoms occasionally occurred for a year or two afterwards, and were frequently attended with alveolar abscesses. The remaining incisors of the upper jaw, and several of the inferior and superior molar teeth, were found to be in a dilapidated state. The alveolar processes of several of the inferior molares were partially destroyed, and one or two of their roots were turned on one side, and clung to the alveoli by the remaining integuments.

“The situation of the mouth rendered it quite probable that the ill health of the patient arose from the irritation produced by the bad state of her teeth; the more so, as her nervous system was exceedingly sensi-

tive. She was persuaded to have the carious incisors, and the worst of the molars, removed, and a short time after this was done, her health began to improve. The affection of the head and scalp soon ceased, the nervous symptoms vanished, and she is now in good health, and has a set of teeth decidedly more ornamental than those given her by nature ever were. The speedy restoration of her health, after the removal of her diseased teeth, justifies the conclusion that her bad health depended on the bad state in which these organs were found."

"CASE 2d. Miss W——, a maiden lady of about fifty years of age, in comfortable circumstances, and for the most part addicted to sedentary occupations, had suffered much from a pain in the right cheek. For some time, it was not regarded as of much moment; but, on its continuance, a physician was consulted. He found but a single tooth, one of the second molares, in the superior maxillary of the affected side, and that was in a semi-decayed state. The gums above the tooth, and for half an inch on each side of it, were much swollen and of a livid redness. The tumor seemed spongoid and puffy to the touch; but there was neither fluctuation nor abscess. The patient's health had not sensibly deteriorated. She said the tumor on the gums had existed for many weeks, but had not been attended with any remarkable pain, until the occurrence of that of which she complained. She described it as being deep in the cheeks and generally dull, but now and then, for an instant, sharp and lancinating. She said the tooth, for several years past, had been accustomed to ache occasionally, but that, notwithstand-

ing its decayed state, it was very useful, and that she had, therefore, declined having it extracted.

“The immediate extraction of the tooth was, however, thought advisable, and, with her consent, it was effected. A week after the operation, the spongy tumor of the gum continued, without any abatement of the pain in the cheek. The tumor was now laid open with a lancet. It contained no matter; but was filled with those shaggy or shreddy fungi which are often seen to occupy tumors on diseased bones. An abscess, or some other affection of the antrum maxillare, was suspected; a perforation was therefore made in its cavity, and about a table-spoonful of very dark brown matter discharged, which gave the silver spoon, into which it was received, a thin coat of the blackest pigment, and, on account of its offensive smell, was almost insupportable. There was a difficulty in reaching the disease with remedies, and it was thought advisable to enlarge the communication with the antrum. The crown of a small trephine was accordingly applied to the alveolar portions of the superior maxillary, the soft parts having first been dissected up, and a corresponding portion of the bone removed. The end of the little finger could now be inserted into the antrum, the inner surface of which, it was easily perceived, had, at several points, been denuded of the pituitary membrane, and of the periosteum. The disease was now fairly exposed, and nothing could exceed the offensiveness of its fetor when not corrected by suitable dressings. The usual antiseptic and detergents were locally applied, while tonics and a generous diet were prescribed to sustain the patient's general health, and every effort was made

to substitute a healthy purulent secretion for the ill-conditioned and offensive discharge from the antrum, but without any beneficial effect.

“An irremediable necrosis seemed to have taken possession of the superior maxillary of the affected side, which soon began to come away by piecemeal. In the mean time, the soft parts about it were laid waste by the phagedænic character of the ulceration, and the eye of the same side became seriously affected. The disease now progressed rapidly. The perforation of the antrum was made on the 11th of March, 1821, and on the 26th of the May following, the patient was found in a perfect state of apoplexy, the disease having penetrated the bones constituting the basis of the cranium, and seized upon the brain itself. On the 30th of the same month she expired, and was thus released, by death, from the most horrible disease that can be conceived, but which had its origin in nothing more extraordinary than a neglected carious tooth.

J. M. S.”

No one, after reading the above, can doubt that local, and even constitutional disturbance, and that too of a serious character, do sometimes arise from irritation produced by decayed teeth.

The second of these cases was doubtless the result of inflammation produced by the decay of the tooth mentioned by Dr. S., first in the periosteum of its fangs, then in the alveolar membrane, and finally in the periosteum and mucous membrane of the antrum itself.

Had the tooth been removed when it first became decayed, or when the one which it antagonized was lost,

the effects that ensued would, in all probability, have been prevented; for, it is worthy of remark, that whenever a tooth ceases to have an antagonist, the periosteum of its fangs usually becomes inflamed; and the adjacent parts are, consequently, involved in an unhealthy action.

Two cases, of a somewhat similar character, have come under my own observation. The subject of one of them, was a gentleman of active habits, sound constitution, and about forty-five years of age. That of the other was a lady of from thirty-five to forty years of age, naturally rather delicate in health, bilious temperament, and of sedentary habits. In both of these cases, a dark brown semi-transparent and fetid matter was formed in the antrum, which, in the one instance, was discharged, through the opening, into the nose; and in the other, was confined in the antrum until an artificial opening was made by extracting a tooth and perforating the floor of this cavity. The usual treatment for such cases was steadily pursued for several weeks, but without effecting any thing more than temporary relief, and a permanent cure was at length obtained only by extracting a number of teeth that were decayed and that had been loosened by the absorption of the alveolar processes.

It is highly probable that most of the morbid conditions, to which these cavities are liable, are occasioned by some unhealthy action in the teeth, not only because of their proximity to these organs and the numerous nervous connections that they have with them, but also because the teeth, and their dependant parts, are exposed to frequent diseases, which are usually attended with much inflammation.

The following cases of dental irritation were kindly furnished me by Dr. M——, a scientific and eminent practitioner of medicine in this state:

“CASE 1st. In the summer of 1834, I was called on to visit Mr. D. M——, who had come into this neighborhood to obtain the benefit of the country air, having resided in Baltimore from his earliest youth. When I saw him, he was in the last stage of phthisis pulmonalis. He gave me the following history of his case:

“About eight years previous, he felt a soreness and tumefaction in his gum at the posterior part of his mouth, and as he had never cut the dentes sapientiæ, he thought the disquietude was occasioned by the progress of one of these teeth, and, in consequence, gave it no attention until the soreness and inflammation had extended themselves over the whole surface of the mouth and fauces. The tooth not having protruded through the gum, he consulted his family physician, who advised immediate extraction. He, in conformity with this advice, called on an eminent surgeon dentist of Baltimore; but the tooth not having presented itself, and the cause of his suffering being doubted, the operation was deferred. His sufferings, however, having become intolerable, and the irritation having extended itself to the lungs, producing considerable uneasiness, he determined, if it were at all possible, to have the tooth removed. A few days after, he stated this determination to the dentist. The gum was freely split, and after considerable pain and difficulty, the tooth extracted. The inflammation of his mouth and fauces immediately subsided—his appetite returned, and his general health soon became as good as formerly.

"About three years subsequent to this, his mouth and fauces, under similar circumstances, and from the same cause, became very sore and painful; the inflammation soon reached the lungs and established a confirmed phthisis pulmonalis; for which he had taken much medicine, and resided several years in the south, but without obtaining relief. He died a few weeks after my first visit.

"CASE 2d. My friend, Dr. L——, of Frederick, was called to visit a young gentleman, who labored under violent pain of the face and inferior maxillary, with very great tumefaction of the gums. His sufferings were traced to the roots of one of his molar teeth, which had been broken in an attempt to extract it. His gums, and the glands of his throat, became so much enlarged that it was impossible to remove the offending portion of the tooth; the inflammation, notwithstanding the skilful exertions of the physician, rapidly increased; high and intractable fever supervened; deglutition became totally obstructed, and in a few days, he died. S. W. M."

Mr. Koecker gives the following history of a case of hypochondriasis, that came under his observation in 1824:

"Mr. F——, a literary gentleman in the neighborhood of London, had been for some years under the medical care of Mr. J. Derbyshire, of Grub-st., Soho, on account of a constant state of derangement of digestion. Much sedentary occupation, and some excessive grief, had, of late, greatly augmented the distressing symptoms generally accompanying this cruel disorder. His disease had assumed the character of hypochon-

driasis. His spirits were so dejected, and the state of his body was so low, that he was no longer capable of attending to his ordinary business.

“Having had some conversation with Mr. Derbyshire on the influence of diseases of the teeth upon the general health, that gentleman was induced, at his next visit, to inquire into the state of his patient’s teeth; and learning that they were in a very deplorable condition, he proposed a consultation with me on the subject.

“After a particular examination, I found every tooth in the patient’s mouth more or less carious or dead, and the gums and sockets in a very diseased state.

“On the 27th of May, 1824, twenty-one teeth and roots were extracted; all of which were more or less in a state of putrefaction, three large grinders only excepted, which were either suffering from complicated caries, or producing morbid irritation upon the other parts from some other cause.

“Four upper and two under incisors, two upper and two under cuspidati, and two under bicuspidates, fourteen front teeth, in all, were left remaining. These, and all the other parts of the mouth, were restored to health in the course of about six weeks.

“During the progress of the treatment of the diseases of the mouth, the general health improved very surprisingly, and on the restoration of perfect health to all the remaining teeth, and their relative parts, the patient enjoyed uninterrupted good health, and returned to his ordinary professional avocations.”

Dr. Darwin particularly notices the agency of diseased teeth in the production of hemicrania and earache. In speaking of the former, he says: “This disease

is attended with a cold skin, and hence, whatever may be the remote cause, the immediate one seems to be a want of stimulus, either of heat or distention, or some other unknown stimulus in the painful part, or in those with which it is associated. The membranes, in their natural state, are only irritable by distention; in their diseased state, they are sensible, like muscular fibres. Hence, a diseased tooth may render the neighboring membranes sensible, and is frequently the cause of this disease."

Of sympathetic headache, he remarks: "Where it affects a small defined part on the parietal bone or one side, it is generally termed *clavus hystericus*, and is always, I believe, owing to a diseased *dens molaris*."

After having continued his observations for some time, he gives the following case: "Mrs. —, about thirty years of age, was seized with great pain about the middle of the right parietal bone, which had continued a whole day before I saw her, and was so violent as to threaten to occasion convulsions. Not being able to detect a decaying tooth, or a tender one, by examining with my eye, or by striking them with a teaspoon, and fearing bad consequences from the tendency to convulsions, I advised the extraction of the last tooth of the under jaw on the affected side; which was done, without any good effect. She was then directed to lose blood, and to take a brisk cathartic; and after that had operated, about sixty drops of laudanum were given her, with large doses of bark, by which means the pain was removed. In about a fortnight, she took a cathartic by ill advice, and the pain returned, with greater violence, in the same place; and before I could arrive, as

she lived thirty miles from me, she suffered a paralytic stroke, which affected her limbs and her face on one side, and relieved the pain in her head. About a year afterwards, I was again called to her on account of a pain, violent as before, exactly on the same part of the other parietal bone. On examining her mouth, I found the second molaris of the under jaw, on the side before affected, was now decayed, and concluded that this tooth had occasioned the stroke of the palsy, by the pain and consequent exertion it had caused. On this account, I earnestly entreated her to allow the sound molaris of the same jaw, opposite the decayed one, to be extracted, which was forthwith done, and the pain in her head immediately ceased, to the astonishment of her attendants."

He gives, in another place, two more cases somewhat similar in their character to this, and at the same time remarks, that "earache, like hemicrania, is frequently the consequence of association with a diseased tooth."

Dr. Rush mentions two cases, the one of epilepsy, the other of rheumatism, that were produced by decayed teeth: "Some time in the year 1801, I was consulted by the father of a young gentleman in Baltimore, who had been affected with epilepsy. I inquired into the state of his teeth, and was informed that several of them, in his upper jaw, were much decayed. I directed them to be extracted, and advised him afterwards to lose a few ounces of blood any time when he felt the premonitory symptoms of a recurrence of his fits. He followed my advice; in consequence of which, I had lately the pleasure of hearing from his brother, that he was perfectly cured."

Again, he remarks, "Some time in the month of October, 1801, I attended Miss O. C., with a rheumatism in her hip joint, which yielded for a while to the several remedies for that disease. In the month of November it returned with great violence, accompanied with a severe toothache. Suspecting the rheumatic affection to be excited by the pain in her tooth, I directed it to be extracted. The rheumatism left her hip immediately, and she recovered in a few days. She has continued ever since to be free from it."

Several cases of pain and formation of matter in the ear, and of ophthalmia, produced by a disordered state of the teeth, are given by Jourdain, Koecker, and Fitch, but which, the limits of this work, and the space I have already given to the present subject, will not allow me to quote; I will, therefore, conclude my remarks on this point, by adding two or three cases of *neuralgia faciei*.

It is now generally admitted by medical writers, that this most torturing and agonizing affection arises more frequently from a morbid condition of the teeth than from any other cause. The following interesting case is given by Mr. Koecker:

"Mr. J——, a gentleman of great respectability, a native of this country, but for many years a resident of Smyrna, aged about thirty-nine years, had suffered upwards of ten years with this distressing malady, attended by all its torturing symptoms, in a most unparalleled manner. His whole constitution, but particularly the glandular system, was so much affected as to produce swellings and indurations in the most distant parts, accompanied with great pain and inconvenience, but

its effects on his head were frequently agonizing; indeed he assured me, so great were his sufferings, he had been so far driven to despair, as to implore heaven to relieve him, by putting an end to his miserable existence. He repeatedly applied for the best medical and surgical advice that the country could afford, but the real cause of his suffering was not detected; and such was the character of this disorder, that it baffled every exertion, and all the remedies, which were applied for many years. At length, the effects of a sea voyage, and a visit to his native country, were proposed, and at the same time, a trial of such medical measures as he might be able to command in England.

“Immediately after his arrival in London, this patient consulted Mr. Lawrence. This sagacious and disinterested surgeon soon suspected his teeth to be the chief cause of his malady, and recommended him to have my advice without delay, and to submit to any treatment I should deem necessary and proper.

“On examining the gentleman’s mouth, I found his gums, and all his alveolar processes, more or less diseased. His double teeth, however, had most especially suffered, and so considerable a part of their sockets was destroyed, that their preservation was rendered altogether improbable. I therefore proposed their immediate removal; and, although the gentleman was exceedingly nervous, he acceded to my proposed plan of cure without the least hesitation.

“February 14, 1826. Thirteen teeth and roots were extracted, and the mouth was subsequently cleansed with a gentle stimulant lotion every hour or two in the course of the day.

"February 21st. The remaining front teeth of the upper and under jaws were carefully scaled, as far as the diseased state of the gums would allow of, and the patient provided with the means to prevent the re-accumulation of tartar. He was requested to continue the lotion.

"February 28th. The above operation was repeated, and cleanliness particularly recommended.

"March 7th. The same operation was completed, and a perfect removal of the tartar accomplished; the patient was also directed to proceed as before.

"Thus, by the judicious management of the case by Mr. Lawrence, and the above treatment, the patient was now, in less than one month, restored to perfect constitutional health. His mouth was rapidly recovering from a disease, probably of more than fifteen years standing, and the most important of his teeth were saved from total destruction, and permanently preserved."

The following is the only case of *tic douloureux*, or *neuralgia faciei*, produced by disordered teeth, that has come under my own observation. The subject of it was a lady of about forty years of age, sedentary habits, and of rather a naturally nervous temperament. She had, for several years, been at times afflicted with a most distressing and painful affection of her face, which was pronounced by her attending physician, Dr. D——, to be *tic douloureux*. The pain was sometimes so acute and lancinating that it almost deprived her of reason. It generally commenced near, or a little anterior to the angle of the superior maxillary bone; thence it darted across the face to the ala of the nose, and

then to the temple, forehead, and angle of the eye, accompanied with frequent and sudden transitions from one side to the other, twitching and tremors of the muscles of the affected parts, and with a preternatural flow of saliva. Her face, and sometimes the whole of her head, were rendered so sore by these paroxysms, that the slightest touch would produce pain.

These fits, although they generally were of short duration, frequently recurred as often as ten or fifteen times in twenty-four hours, and sometimes lasted ten, sixteen, and even twenty days, after which they would gradually subside, having subjected her, during their continuance, to the greatest misery, and leaving, after their subsidence, a dull heavy pain in one or both of the jaws. A sensation similar to this, was always (especially in the right side of the upper jaw) experienced several days before one of these attacks, which often enabled her physician to ward them off, and eventually led to the detection of their cause. These spasms were more severe, and occurred more frequently in cold, damp, and wet, than in warm and dry weather.

Bark, quinine, carb. iron, stramonium, belladonna, and various other tonics and antispasmodics, were prescribed, but without any apparent beneficial effect. Leeching, sinapisms, and epispastics were also of no avail. It was determined, as a last resort, to divide the affected nerves, but before the operation was performed, Dr. D. was induced, by the pain in the jaws always preceding these paroxysms, to examine the condition of the patient's teeth. This examination proved them to be in a very unhealthy state. The molaris generally, and those especially on the right side of the

upper jaw, were involved in complicated caries. The gums were much tumefied and inflamed, and the teeth sensitive.

Her teeth and gums, from the diseased condition in which they were found, were immediately supposed to have some agency in producing the affection of the face; a consultation with me was, therefore, proposed, and on the 15th of January, 1831, I was requested to visit her.

On examining her teeth, I ascertained that eleven of them were so much decayed, that their restoration would be impracticable. It was therefore determined to remove them immediately, but it was not thought proper, on account of her extreme debility, and the state of her nervous system, that more than two or three should be extracted at a time.

So great was her agitation at the mere thought of the operation, that, notwithstanding the agony she suffered, she could not, on my first visit, be persuaded to have even a single tooth extracted, but requested me to call on the morrow, when, she promised, she would submit to the removal of as many as she could possibly endure.

I accordingly called on the following day, and to the astonishment of her friends, she allowed all her jaw teeth that were carious, eleven in number, to be at once extracted. This operation immediately revealed the cause of her disease. The roots of three of these teeth were very much enlarged by bony depositions. One of the fangs of one was, at its extremity, about the size of a pea, those of the other two were not quite so large, but a disposition to exostosis was manifested by all. With

the removal of these teeth all symptoms of pain entirely vanished, nor have they since, to my knowledge, ever returned.

The above are a few of the many cases that might be brought forward to illustrate this part of our subject, but the space to which we are limited, will neither allow of their introduction nor permit us farther to cite the many respectable authorities that might be adduced to this same point.*

* We cannot, however, forbear quoting the following:

"Hufeland enumerates firm and sound teeth among the signs of long life. 'For good digestion, *good teeth*,' says he, 'are extremely necessary; and one, therefore, may consider them among the essential properties requisite for long life, and in two points of view. First, good and strong teeth are always a sign of a sound, strong constitution, and good juices. Those who lose their teeth early, have, in a certain measure, taken possession of the other world with a part of their bodies. Secondly, the teeth are a great help to digestion, and consequently, to restoration.'"—*Journal of Health*, July, 1831.

"Amongst the most common and painful effects of decayed teeth are, extreme pain, felt not only in the nervous pulp of the body of the tooth, but also along the branches of the nerve which supplies the teeth generally, as well as to the other divisions of the great nerve of which it is one of the chief branches. When we learn that the great nerve of sensation, the fifth of the anatomist, ramifies to the eye, ear, nose, mouth, over the cheek, and supplies the branches distributed to the teeth, and the angle and lower part of the jaw, we can understand why irritation at one part of this great and irregular chain, as of a tooth, should be so sensibly felt at other and even remote parts; for even the temples and side of the head are not strangers to the pain of toothache. It is not necessary, however, that there should be always much, or even any pain from a decayed tooth, to cause numerous troublesome pains of the face and head; old stumps are a common cause of these affections, which, when of frequent recurrence, require at last a complete removal of the offending cause, that is, extraction of the decayed stumps.

"Nor is the secondary irritation from decayed teeth always confined to the face and head: it not unfrequently displays itself in all the symptoms of indigestion; and, at times, of periodical or intermittent fever, with many anomalous nervous symptoms, resembling hysteria."—*Journal of Health*, Aug. 1831.

"From the presence of carious teeth, or decayed portions of teeth, many evils, both local and general, ensue, besides inflammation and abscess. They are frequently the cause, and the sole cause, of violent and continued headaches;

of glandular swellings in the neck, terminating in, or combined with, abscess; of inflammation and enlargement of the tonsils, either chronic or acute; of ulcerations of the tongue or lips, often assuming a malignant action from continued irritation; of painful feelings in the face, *tic douloureux*, pains in the tongue, jaws, &c.; of disordered stomach, from affection of the nerves, or from imperfect mastication, of continued constitutional irritation, which may give rise to serious diseases."—*Liston's Surgery*, p. 278.

CHAPTER III.

DENTITION OF THE DECIDUOUS OR TEMPORARY
TEETH—IRRITATION, &c. CONSEQUENT UPON IT.

As the services of the dentist are seldom called into requisition before the eruption of the permanent teeth, we shall not attempt to describe minutely the manner in which the temporary teeth are formed, nor the *modus operandi* by which their emancipation from the gums is effected, but as they exert a great influence over the formation and position of the second set, their anatomy will be briefly considered, but only so far as it may be necessary, in order to understand the explanation that will hereafter be given, of the difference that there is in different teeth, as to their liabilities to disease.

The rudiments of the first, and of a part of the second set of teeth, are formed at very early periods of fetal life. They consist of minute pulps, secreted from the gums, situated along the edges of the maxillæ, and resemble, in their shapes, the crowns of the respective teeth that they are destined to form.

Each pulp is enclosed in a membranous sac,* which is placed in a bony cell, called the alveolus or socket, that shoots up from the edges of the jaws.

The embryo teeth, during their ascent through the gums, are gradually elongated; which elongations are converted into bone, and constitute the fangs of the teeth. The prolongation of the pulps, however, does not keep pace with the growth of the alveoli, which, in a short time, almost entirely enclose them.

This is one of the most beautiful operations of the animal economy; by which the system is admirably adapted for the change that it undergoes at birth. By this contrivance,† a firm support is given to the gums; and the teeth, while in a soft and amorphous state, are

* "This membrane adheres by its outer surface all around the bony cavity of the jaw, and also to the gum where it covers the alveoli.

"When the pulp is very young, as in the fœtus of six or seven months, this membrane is pretty thick and gelatinous. We can examine it best in a new-born child, and we find it made up of two lamellæ, an external and an internal. The external is soft and spongy, without any vessels; the other is much firmer, and extremely vascular, its vessels coming from those going to the pulp and body of the tooth. While the teeth are within the gum, there is always a mucilaginous fluid, like the synovia in joints, between this membrane and the pulp of the tooth."—*Hunter*.

"They (the membranes) can easily be separated into two lamellæ, the external of which is spongy and full of vessels; the internal one is more tender and delicate, and seems to have no vessels that are capable of conveying red blood."—*Dr. Blake*.

"When a jaw has been minutely injected, we find that the pulps are vascular, and also the membranes by which they are enveloped. These membranes may, with care, be separated into two lamellæ, the external of which is of rather a large and spongy texture, and possessed of vascularity; the internal lamella is more smooth, and is also vascular; the membranes derive their vessels from their gums, and the pulps receive theirs from the artery which passes through the jaw. * * * * * In several preparations which are minutely injected, taken from the human subject, and also from the fetal calf, I have found both the lamellæ to be very vascular."—*Fox*.

† See Good's Study of Medicine.

protected from the injury to which they otherwise would be exposed, from the pressure that would of necessity be made upon them by the infant while sucking.

The ossification of the teeth commences, first upon the cutting edges of the incisors, next upon the tips of the cuspidati, and then upon the points of the bicuspidates and the eminences of the molares. Thence it gradually extends itself over the whole surface of each pulp, and commencing on the exterior and proceeding to the interior, forms one complete layer or stratum of bone after another, until nothing remains but a small residuum of the pulp, placed within the proper dental cavity, whose parietes are lined with a delicate membrane, upon which the vessels and nerves ramify before entering the osseous structure of the tooth.*

* "When the ossification of a tooth is commencing, bone is deposited from the vessels of the pulp upon its extreme points. In the incisors it begins upon their edges, and in the molares, upon the points of their grinding surfaces. The ossification usually begins in the incisors in three spots; these increase, soon unite, and produce the cutting edge of the tooth: in the *molares* it begins in as many spots as there are grinding points, which, in the lower jaw, are commonly four, and in the upper, five: these soon unite and form one thin layer of bone of the upper surface of the pulp. The ossification soon extends to the sides of the pulp, and a thin shell of bone is spread over its whole surface.

"The cavity within a tooth, as it is forming, is at first very considerable; it becomes less as the formation advances, until it arrives at a certain point, when a cavity is left in it, extending nearly through the whole length, and retaining the shape of the tooth.

"In the crown of the teeth, the cavity is of the same figure, and it divides into as many canals as there are fangs to the teeth, a canal extends through each fang connected with the cavity in the body of the tooth: into this cavity the nerves and blood-vessels enter and ramify upon the membrane of the pulp, which remains to line the cavity after the formation of the teeth. In this manner the nerves give sensation to the teeth, and the internal parts of them are nourished."—*Fox, from pages 22, '3, '4.*

The crowns of the deciduous teeth have attained their full size, and are perfectly formed, at birth. But when the period has arrived, at which the increased strength of the animal economy requires a diet better suited to support its energies than the milky one on which it has hitherto subsisted; nature, as if conscious of the change that has taken place, calls into action certain agents, by which openings are made in the alveolar cells and superincumbent gums, through which the little germs, sparkling with whiteness, gradually and slowly emerge, pair after pair, until the pearly arches are completed, to answer the demands of increasing wants, and to assist in the articulation of those lisping accents, by which the child's early wishes are made known.

The age, at which the eruption of these teeth begins, is variable, depending probably upon the constitutional health of the child. They, however, generally commence to protrude between the fifth and eighth months of infancy, and the whole process is usually completed between the twenty-fourth and thirty-fifth.

According to Mr. Thomas Bell, the four central incisors appear at from five to eight months after birth; the four lateral, from seven to ten; the four anterior molares, from twelve to sixteen; the cuspidati, from fourteen to twenty; and the four posterior molares, from eighteen to thirty-six.

My own experience on this point (and it is one to which I have paid considerable attention) leads me to believe that Mr. Bell is somewhat in error in regard to these periods, especially in reference to those for the appearance of the posterior molares. No general rule,

it is true, can be given, to which there will not be many exceptions; yet, had he stated from twenty-four (instead of from eighteen) to thirty-six months, he would have been much nearer the truth; for, though these teeth are sometimes cut as early as eighteen, (in one instance, I knew them to be seen at sixteen,) yet it rarely happens that they protrude either before twenty-four, or after thirty-five months.

There is sometimes, however, an extraordinary hebitude of action in the eruption of these teeth. There is a case of a child, on record, that did not cut any of its teeth until it was ten years old. In other cases there is a precocity of action equally as remarkable; as when, for instance, the two lower central incisors are cut at birth.

Of these early productions, Mr. Fox remarks: "As they only have a weak attachment to the gums, they soon get loose, producing a considerable inflammation in the mouth of the child, as well as occasioning considerable inconvenience to the mother. It is, therefore, advisable to extract them immediately; for they can never come to perfection."

The attachment of these teeth, it is true, is generally, but not always, weak; nor are they always confined to the gums alone, but are often, on the contrary, securely fixed in a socket of bone. In such cases, they do not occasion any inconvenience, and their extraction may be attended with evil consequences; it is, therefore, always better to wait until there is some positive indication that such an operation is necessary.

The teeth of the lower jaw, in their eruption, usually precede those of the upper, about two or three months.

A hard, semi-transparent, vitreous substance, called the enamel, covers the crown of the tooth, or that part which is not contained within the socket and gum. Its formation commences as soon as one complete layer of bone has been spread over the surface of the pulp. At this period the sac in which the rudiment is enveloped, becomes thicker, assumes a more vascular appearance, and discharges from its vessels a thick fluid that bathes the whole surface of the crown. This liquor soon condenses, assumes a chalky appearance, and, by a process somewhat similar to chrystalization, eventually becomes almost as hard as glass.

The chrystals, of which this outer covering is composed, are so arranged around each tooth, that they resemble radii shooting from a common centre; and thus afford the greatest amount of protection, of which their substance is capable.

It will be seen, from this cursory view of the formation and dentition of the deciduous teeth, that their bony structure is formed from the pulps, their enamel, from the membraneous sac within which their rudiments are contained, and that the ossification of the ganglion always precedes the secretion of the enamel.

IRRITATION, &c. CONSEQUENT UPON IT.

When we consider the early age at which first dentition commences, and the fragile, irritable state of the system, it will not appear at all wonderful that it should so frequently suffer from the efforts that are made by it for the liberation of these organs, from the bony cells

cells and superincumbent gums, in which they are confined. The constitution, at this tender period of life, often receives a shock from which it never recovers; and the seeds of many chronic diseases are caused to germinate, which otherwise, in all probability, would have remained forever dormant.

This is generally regarded as the most critical period of life, and has often proved one of bereavement and sorrow. The whole process is sometimes completed without inconvenience, but at other times, it is attended with so much pain and irritation that the most alarming and complicated forms of disease follow.

The irritation that arises from first dentition is caused by the pressure that the teeth make upon the gums in forcing their way out, and varies in its extent, according to the previous health and temperament of the child. When the absorption of the gums keeps pace with the growth of the teeth, the pressure is scarcely, or not at all, sensible; but when this is not the case, it becomes more or less great, in proportion as the growth of the one outstrips the absorption of the other.

“This pressure,” Dr. Good observes, “is not uniformly exerted through the whole course of teething, but is divided into distinct periods or stages, as though the vital or instinctive principal, which is what we mean by nature, becomes exhausted by a certain extent of action, and requires rest and a state of intermission.

“The first or active stage of teething is usually about the third or fourth month of infancy, and constitutes what is called breeding the teeth, or the conversion of the pulpy rudiment, buried in the gums, and formed

during fetal life, into a solid material, which, at the same time shoots downward, and gives to every tooth a neck or fang."

During the period of teething, the child is restless and fretful, but its paroxysms of suffering are periodical, and seldom last more than two or three hours at a time; whereas, were the pressure of the teeth upon the gums uniform and constant, there would be no such intermissions as are here described. The repose thus afforded, enables the system somewhat to recover from the exhaustion that has been occasioned by each preceding paroxysm, otherwise, its excited energies would soon be worn out, and the child fall a victim to the continued intensity of its sufferings.

Dr. Good, however, is mistaken, when he supposes that the pulpy rudiment begins to be converted into a solid material, at the third or fourth month of infancy, when, what he calls the first or active stage of teething, commences. The bony part of the crowns of the deciduous teeth is perfectly formed at birth, though their enamel is not completed until a later period. The elongation of the pulp commences about the time mentioned by Dr. Good, and this seems to have been confounded by him with its ossification.

When the irritation is merely local, it is generally of short duration, subsiding as soon as the teeth are freed. In such cases, the only unpleasant symptoms are a slight tenderness and tumefaction of the gums, and an increased secretion of saliva. This secretion, however, is very beneficial, since it tends to diminish the action in the vessels of the inflamed parts. But when the irritation is so severe that it affects the functional opera-

tions of other parts of the system, febrile symptoms of a general, and of a more or less aggravated character, supervene, and are attended with drowsiness, diarrhoea, and not unfrequently, with various cutaneous eruptions on different parts of the body. Sometimes, these consist of what is called the red gum; and at other times, of pustules, which are at first filled with a limpid fluid; but afterwards, become purulent. The former of these appears on the neck and face: the latter is not confined to any particular part of the body, but is either thinly scattered over its whole surface, or appears in small patches.

There is also another kind of eruption that occasionally follows irritation from first dentition. It breaks out about the mouth, the cheeks, and forehead, and sometimes extends to the scalp, which in a short time becomes dried up and covered with disagreeable scabs, which soon drop off to be succeeded by others.

These eruptions are generally regarded as indications of the substitution of a milder for a more aggravated form of disease, and should not, therefore, be too hastily suppressed.

To these symptoms, we may add: cough, spasms of the muscles of the face, particularly of those about the mouth, and, when the diarrhoea is so copious that it occasions great emaciation, convulsions, that frequently cause the death of the patient.

Thus far, we have merely glanced at a few of the effects of first dentition. To attempt a description of all, would involve the enumeration of the whole catalogue of diseases peculiar to infancy, which, as they more properly belong to another branch of medicine,

we shall here neither stop to detail, nor to point out minutely, their curative indications.

I cannot, however, dismiss this part of our subject without briefly noticing some objections that have been urged by many practitioners, to an operation which is simple and harmless, and at the same time very efficient, in removing one of the most frequent causes of these complaints. I allude to the lancing of the gums.

There exists much causeless opposition to this practice, and the objections of its opponents, though they have been shown to be groundless, are again and again reiterated, and, to one unacquainted with the subject, not without some seeming plausibility.

By some it is objected, that, though the opening of the gum may afford temporary relief, yet the cicatrix, formed by the healing of the wound, forms a greater obstacle to the exit of the tooth, than the parts, when left to themselves, ever do. Now, any one who is at all conversant with the subject, knows, that in four cases out of five, where the operation is necessary, the teeth are so far advanced, that on the collapsing of the edges of the wound, their crowns immediately protrude: and even when the wound does unite, the soft and spongy cicatrix, much more readily yields to the action of the absorbents, than the unpunctured gum ever would have done.

Another objection is founded upon a supposition that the enamel, at this early period, is in a soft and amorphous state, and that, consequently the teeth may be injured by contact with the knife. But, as the parts of the enamel that are exposed to the instrument usually attain their greatest hardness before this operation is

required, this objection is without foundation. In short, I have never known any injury to result from it, either in my own practice, or in that of others; nor can those that are opposed to it, bring facts to support their opposition.

This practice often succeeds after all others have failed. I have frequently known children, after having suffered the greatest agony for days and weeks, until they were reduced to mere skeletons, to obtain immediate relief without the aid of any other remedy than this, which at once removes the cause, whereas, the others only counteract the effects of suffering, and can, therefore, only be considered as palliatives, that may assist nature in her struggle with disease, but cannot always prevent her from sinking in the contest.

PRESERVATION OF THE DECIDUOUS TEETH—ITS IMPORTANCE TO THE HEALTH AND DURABILITY OF THE PERMANENT ONES.

It is very important, that the deciduous teeth should be preserved until they are removed by the absorption of their fangs; because, in their health, is involved the durability and health of the permanent teeth; which are intimately connected with the health and comfort of the individual. But as the structure and character of these sets of teeth are so different, the treatment prescribed for one, should but seldom be used for the other.

The first thing necessary for the preservation of the temporary teeth is, that they should be kept clean.

This may be effected by a free use of a tooth-brush at least twice every day; for example, morning and evening. A soft, elastic child's brush, with bristles from three-eighths to one-half an inch in length, is well suited to this purpose, because it adapts itself to all the inequalities of the teeth, and will remove, if well applied, every particle of food, that may have lodged between them, or have been retained in any of the indentations upon their grinding surfaces. By the friction of the brush, a healthy action is also imparted to the gums, and the clammy mucus, with which the teeth of children are almost always covered, and which constitutes one of the most frequent causes of their decay, is entirely removed.

If parents and guardians would pay more attention to the teeth of their children, the services of the dentist would much less frequently be required.* On this subject, however, a mistaken notion very generally prevails.

Many persons suppose that the teeth, in the early periods of childhood, require no attention, and thus are very often guilty of the most culpable neglect of the future well-being of those entrusted to their care. It

*The following appropriate remarks are from Mr. E. Parmly's notes to Brown's *Dentologia*. The high reputation of Mr. P. as a practitioner, and his extensive experience, entitle them to more than ordinary respect:

"This is a subject which demands the attention of parents, and those who are entrusted with the care of children. It should be the first object of every person so situated, to habituate children to clean their teeth at least twice a day, and when this practice has been once adopted, it will be continued as a matter of course. Besides this, from the age of six to twelve years, in particular, a dentist should be consulted from three to four times a year, and at a later period, once or twice, for the purpose of examining the teeth, and counteracting, by the timely removal of such causes as may produce disease, any mischief which is likely to take place.

"In London and Paris, and I believe in all the larger cities of Europe, the

should be recollected, that the adult teeth are at this time being formed, and that, in proportion as the functional operations of the parts concerned in their production, are carried on in a perfect and healthy manner, so will they be perfectly and healthily constituted, and enabled the more effectually to resist those causes of decay, of which we shall hereafter more particularly speak.

Most of the diseases, to which the teeth of children are liable, are the result of inattention. When any particles of extraneous matter get between the teeth, or lodge along the edges of the gums, they in a short time undergo a chemical decomposition, and become a source of great irritation to the gum, vitiating the salivary and mucous secretions, and rendering them prejudicial to the health of every part of the mouth.

The deciduous teeth, from these causes, are often very soon involved in general and complicated caries, subjecting the sufferer to the most torturing pain, and depriving it of the first set long before the time for the appearance of the second has arrived. Some teeth are more susceptible to the action of chemical agents than others, and are consequently more liable to disease.

principal academies and boarding schools are regularly attended by dentists, for the purpose of having the children's teeth examined, and of performing such operations as they may require, when necessary. I should be glad to see this plan more universally adopted in our own cities, for I am convinced the advantages arising from it are incalculable; for, if proper care and attention be not paid during the time the teeth are shedding, a countenance, however naturally beautiful, may, in consequence, be totally disfigured; and it frequently happens, that an unpleasing countenance, although united to an amiable mind, produces a dislike that is not easily overcome. 'It is, therefore,' says Mr. Murphy, 'a duty incumbent on parents, and those who have the care and education of youth, while they do justice to their minds, not to overlook their personal advantages.' "

When they are of a hard, dense texture, they are not easily affected; but when they are soft and chalky, the greatest care and attention is necessary in order to preserve them even for the short period their presence is required.

The use of the brush should be commenced at an early age, at the third year, for example, and be used sufficiently often to prevent the teeth from becoming stained or in any way discolored; otherwise, the advantages that are to be derived from it, will only be partially attained; for, after they have once commenced to decay, though it may retard the progress of the caries, yet it cannot restore them to health.

Many persons are under the impression that a powder ought always to accompany the use of the brush. This is not a fact. Cases, it is true, do sometimes occur, in which dentifrices are necessary; but it is only as remedial agents; as preventives they are never required.*

When the enamel, from any cause, becomes stained, a powder should be used once or twice a day, until it be restored to its natural color; but if, at the same time, the gums are in a spongy and turgent state, the application of a powder of any kind whatever is highly improper, since it tends to increase the irritation, and by thus rendering the secretions of the mouth still more vitiated and viscid, hastens the destruction of the teeth.

*On the cleanliness necessary to the preservation of the first denture, Mr. Murphy observes, "As soon as the teeth of a child are completed, they should be brushed twice, or, at least, once a day, with a soft brush and water. When children are thus early familiarized to the healthy and necessary custom of brushing the teeth, it becomes a fixed habit, and they find it ever afterwards absolutely essential to their comfort. In winter, or in cold weather, the water used in brushing the teeth should be tepid. It is quite unnecessary to use any kind of powder to the first teeth of children."—*Murphy on the Teeth*, p. 118.

The benefits that are derived from the use of tooth powders, is owing to their mechanical action upon the teeth. Great care should therefore be taken to select those that are not composed of ingredients that exert a chemical action upon the teeth, since most of those vended in the shops contain more or less acid, which soon corrodes the teeth, giving them a temporary whiteness, by removing a very fine layer of the enamel.

Caries of the temporary molares may sometimes be arrested by plugging; but this should never be attempted after the absorption of their fangs has commenced. The deciduous cuspidati and incisors should never be plugged. The use of the file has been recommended for the removal of superficial caries from the lateral surface of the temporaries; but, we think, with very questionable propriety. The jarring produced by this operation, would probably disturb the permanent teeth, and interfere with their healthy formation.

Whenever these teeth decay and ache, anodynes should be applied, in order that they may be retained in the jaws as long as possible.

The progress of decay is generally more rapid in the temporary than in the permanent teeth, but the pain of the former is less excruciating, and generally yields more readily to odontalgics; for as it is, in both cases, produced by inflammation or exposure of the lining membrane, or by inflammation of the alveolar membrane or periosteum of the fangs; when these (as in the case of the temporaries) are absorbed, the pain must of course cease.

The inflammation, however, is sometimes so great as to occasion suppuration and alveolar abscess. When an occurrence of this kind is apprehended, leeches should be applied to the inflamed gum, and if they fail to afford relief, the faulty tooth should be at once removed; for, it is better to risk the consequences of its premature loss, than the injury that an abscess would almost certainly inflict upon its successor.

These teeth, however, should, if possible, be retained, until, from the spontaneous absorption of their fangs, they drop out of themselves; nor should their extraction ever be determined on, unless required by some pressing emergency; for their premature loss generally occasions a contraction in the span of the maxillæ, and a consequent irregularity in the arrangement of the permanent teeth.

In conclusion, we would remark, that every morbid condition of the gums, not only tends to impair the health of the deciduous teeth, but also to contribute to an imperfect formation of the various parts of the permanent set, and especially of their enamel, which is produced from a membraneous sac, that derives its support exclusively from the gums.

In proportion, therefore, as the gums become diseased, the enamel is imperfectly formed, and the protection which it affords the teeth lessened; and hence, teeth that have been formed while the gums were in an unhealthy condition, are more easily acted upon by chemical agents, or injured by mechanical violence.

CHAPTER IV.

DENTITION OF THE ADULT TEETH—PROPER MANNER OF DIRECTING IT.

A very curious and interesting process of the animal economy, is exhibited in the gradual wasting away or absorption of the roots of the temporaries, and in the formation and dentition of the adult teeth. The time of life when this occurs, forms an important epoch in the history of every individual.

When the deciduous teeth have subserved the purposes for which they were designed, their fangs are gradually and slowly removed by the absorbents; and, as the crowns, pair after pair, are loosened and drop out, other and more substantial teeth come forward to take their places, and fill up the increased span of the dental arch.

The necessity of such a change will readily appear, when we consider, that each of the jaws during childhood, constitutes only about the half of a circle, but as man advances in years, they gradually become elongated, so that by the time he attains the age of an adult, they

form nearly the half of an ellipse; and hence, the number of teeth required to fill them, at the one period, is but little more than half the number requisite at the other.

Moreover, the food of children is principally vegetables, which require but little mastication to prepare them for the stomach, whereas that of adults consists of an almost equal additional portion of animal substances, the cohesion of whose particles is much stronger than that of vegetable matter, and hence it requires a more numerous and robust set of teeth for their separation.

So admirable is the economy of second dentition, that even before the shedding of the primitive teeth, and as soon as the jaws are sufficiently enlarged, four of the second set, one on each side of both maxillæ, make their appearance. Consequently, the number of teeth, after the completion of the first set, is never, unless by accident or disease, at all diminished.

The first set of teeth are shed in the same order in which they were cut. After one pair has been removed, a sufficient time usually elapses, before the removal of another, for those of the same class of the permanent teeth to come forward and take their places. Thus the jaws are never deprived, unless from some other cause than the absorption of the fangs of the temporaries, of more than two teeth in each at any one time.

The irritation produced by second dentition, is usually very slight, and seldom occasions any inconvenience. This is owing to the fact, that by the time it commences, the system has acquired so much strength and vigor,

that it is not easily affected by slight morbid impressions, and that the gums offer very little resistance to the exit of the teeth, for when the temporaries drop out, the others have generally so far advanced, as almost immediately to protrude. And even when this is not the case, the gum that forms over the permanent tooth is usually of so spongy a texture, that it readily yields to the action of the absorbents. The process, too, is more gradual, from six to eight years being required for its completion, while the dentition of the deciduous teeth is perfected in less than half this time.

Second dentition usually commences at about six or seven years after birth, and is generally completed, as far back as the second molares, at from twelve to fourteen. The *dens sapientiæ* are seldom cut before the eighteenth or twentieth year. The times, however, at which the eruption of the adult teeth occur, vary so much, that it is impossible to state them with any degree of accuracy. Sometimes, the first permanent molares are cut at four years, and the central incisors at five; at other times, they do not appear before nine or ten.

But as it is very important, that the respective periods at which the permanent teeth are cut, should be known, we will endeavor to state them as accurately as possible, and at the same time to throw out a few hints on the progressive enlargement of the maxillæ.

The anterior molares usually appear, at from five to six years after birth; the central incisors, from six to eight; the lateral, from seven to nine; the anterior bicuspides, from nine to eleven; the posterior, from ten to eleven and a half; the cuspidati, from eleven to

twelve; the second molares, from twelve to fourteen; and the dentes sapientiæ, from eighteen to twenty.

It is said by some that we are indebted to Dr. Blake for the first correct description of the formation of these organs, who, in an inaugural dissertation, published in Edinburgh in 1799, described the structure of the teeth in the human subject, and in various other animals. Dr. B's title to this discovery is, however, somewhat questionable, since it is supposed, by some, to have been made about twenty years before, by a French dentist, of the name of Herbert; but to which of these two belongs the honor, I will not presume to determine, but am inclined to believe that the former is not entitled to as much credit for the discovery as is usually awarded him.

Having, in a former place, briefly alluded to the formation of the temporaries, I shall not here notice particularly that of the permanent teeth, since they are formed in the same manner, and of a similar substance. About eight months after conception, the rudiments of the permanent central incisors, are given off from those of the temporary ones. Mr. Fox says that this takes place about the ninth month: but they may be distinctly observed as early as the eighth; and Mr. Bell thinks that he has seen them as early as the fifth. It is probable that they are not uniformly given off at the same period, but I have never observed them so early as the time indicated by Mr. B.

The rudiments of the permanent incisors and cuspidati usually attain their full size at birth, and are situated immediately behind the temporary ones of the same class. The bicuspidæ, soon after, are given off

from the temporary molares, and at about the time when the ossification of the first molares commences, which, in twelve or thirteen months after birth, extends itself over nearly the whole of their grinding surfaces. At about this latter period also, the edges of the permanent incisors, and the tips of the lower cuspidati, are ossified, and in twelve or thirteen months after this, the points of the bicuspidates. The second permanent molares are not ossified until about seven years after birth.

The adult teeth, with the exception of the bicuspidates, are much larger than the temporaries, and, during the time of their formation, are situated in the segment of a much smaller circle, which occasions great irregularity in their arrangement. But, before the shedding of the primitive teeth begins, the permanent ones are brought more forward, by an increase in the depth of the maxillæ, and by the development of their alveolar processes, so that, at about five years, they are situated immediately below the temporaries, occupying places of various depths, and very nearly correspondent to the differences in the lengths of their respective fangs.

The permanent teeth, at this period, are so arranged that they occupy the smallest possible space in the jaws. The central incisors and cuspidati completely fill the anterior part of the dental arch, while the lateral incisors are thrown back behind the latter teeth.

The following concise description of the relative situations of the permanent teeth, at five years, is taken from Mr. Bell:

“In the upper jaw, the central incisors are situated

immediately beneath the nose, the lateral incisors thrown back behind the points of the cuspidati; and the base of the latter scarcely a quarter of an inch below the orbit. In the lower jaw, the cuspidati are placed at the very base of the bone, with only a thin layer beneath them, but the crowding is much less considerable than in the upper jaw, from the smaller comparative size of the incisors.

“The permanent central incisors of the lower jaw, are placed immediately beneath the temporary, with their points directed a little backwards, behind the partially absorbed roots of the latter. The lateral incisor, not yet so far advanced, is placed deeper in the jaw, and instead of being immediately beneath the temporary, is situated with its point between the roots of this and the cuspidatus. The permanent cuspidatus is still very deeply imbedded in the bone, with its point resting between the roots of the temporary cuspidatus, and the first temporary molaris. The two spreading roots of the latter, encompass, as it were, within their span, the first bicuspis, and those of the second temporary molaris; in like manner, the second bicuspis. Nearly a similar arrangement is found to exist in the upper jaw, except that the teeth are altogether more crowded.”

We will now briefly notice the progressive enlargement of the jaws, in order to admit of the regular arrangement of this larger and more perfect set of teeth. During the time of the formation of the teeth, changes are going on in these bones as well as in other parts of the body. As the rudiments of the temporaries increase in size, there is a corresponding increase in the dimensions of the maxillæ, but nothing of this kind

occurs during the earlier stages of the formation of the permanentes.*

At about two and a half years, however, they begin to elongate, and at five are generally sufficiently ample for the reception of four of the permanent teeth, one on each side, in both jaws. This increase takes place principally between the second temporary molares and the coronoid processes, while that part, in which the temporaries are situated undergoes so slight a change that many physiologists, among whom are Hunter and Fox, have been led to deny its existence. The experiments performed by these gentlemen, and adduced to prove their assertions, are very ingenious, and, at first view, appear to be conclusive. By the admeasurement of various jaws, at different ages, they have endeavored to prove, that the increased size of the permanent incisors is compensated for by the comparatively smaller dimensions of the bicuspidæ, and that consequently no increase of this part of the jaw is necessary.

But a measurement of a single jaw, made at different periods, from the time the first permanent molares are out, to the time of the completion of the ten anterior

*"The formation of the alveolar processes, and that of the teeth, take place according to different laws. The jaws grow and enlarge in conformity with the general laws which preside over the increase of the osseous system. The alveolar arches, at birth, are little more than one inch in length; at nine years of age, they are nearly two inches, and at the period of perfect growth, at least two inches and a half long. The depth of the lower jaw in the fœtus at the full time is the seventh, and in the adult the fifth of the whole height of the head. The teeth, on the contrary, uniformly appear with the breadth and thickness, only not the length, to which they will ever attain. In order that the development of these organs may take place in a regular manner, it is therefore necessary that a certain harmony be established between their sizes at different periods, and the alveolar edges of the jaws."—*Bourguery's Anatomy*, vol. 1. p. 70.

permanent teeth, will show that their calculations are not to be relied on.

M. Delabarre, in attempting to prove the incorrectness of these gentlemen's calculations, by a similar course of experiments, appears to have fallen into an opposite error, whence, it would seem, as is justly remarked by Mr. Bell: "That no comparison, instituted between the jaws of different individuals, can be relied on as conclusive." The only way by which we can arrive at the truth of the matter is, by examining the same jaw at different ages, and comparing the several results. "This," says Mr. B., "I have repeatedly done, and have no hesitation in saying, that the ten anterior permanent teeth occupy a somewhat larger arch, than the temporary ones which preceded them, had done." The examinations that I have made, satisfy me of the truth of Mr. B's remarks.

The elongation of the jaws produce a corresponding change in the form of the face. Thus the face of a child is round, that of an adult is long and prominent.

The permanent incisors generally fill the space formerly occupied by the temporaries of the same class and about one-half of that previously filled by the primitive cuspidati. The other half of this space, together with a moiety of that before taken up by the first temporary molares, is occupied by the permanent cuspidati.

The bicuspidés occupy spaces larger, by one-fifth or sixth, than that occupied by the remaining moieties of the first, and the whole of the second temporary molares.

Hence, it will be perceived, that the ten anterior permanent teeth occupy a somewhat larger space than

that which was taken up by the temporary ones that preceded them, and that, were there no increase in the size of this portion of the arch, the uniformity of their arrangement would be more or less disturbed.

This expansion, however, does not always take place; but, on the contrary, the premature loss of one or more of the temporaries, often occasions a contraction, that frequently causes much irregularity in the arrangement of the second set, and sometimes forces its first and second molares so far back, that the dentes sapientiæ are thrown against the coronoid processes, and thus, in many instances, such violent inflammation in the muscles of that portion of the jaw is produced, that the extraction of these latter teeth is unavoidable.

About the third year, the jaws are more rapidly elongated, in order that the first permanent molares, which are at this time slowly advancing, may be accommodated between the second temporary molares and the coronoid processes. This elongation of the jaws continues, until the dental arches have become sufficiently enlarged for the reception of the whole of the permanent teeth.

The wasting away of the fangs of the temporary teeth, and the consequent loosening of their crowns, occasioned many very curious speculations among some of the earlier writers.

Van Sweeten, an author of great celebrity, having observed that when the temporary teeth drop out, they have no fangs, concluded that they never were possessed of any. Gibson, an anatomist of considerable repute in the seventeenth century, from the same circumstance, was led to suppose, that the roots remained

in the sockets, "which," to use his own language, "being like seeds for the new ones, by degrees grow up above the gums, to supply the place of that which was fallen off." Bunon supposes that their fangs are wasted away by mechanical abrasion, caused by the ascension of the permanent teeth. Bourdet is of opinion that they are destroyed by some acrid humor, acting as a solvent;—a supposition that is believed by a few, even at the present day.

The improvements, however, that have been made in scientific research, have conclusively demonstrated the falsity of these assertions, and have shown that the destruction of the fangs of the temporary teeth is produced by the agency of the absorbents.

This absorption has been thought by some to be occasioned by the pressure of the permanent teeth while forcing their way out, first, against the bony cells that are between them and the roots of the temporaries, and then, against the roots themselves.

But this opinion is incorrect. There are many instances of the temporary teeth being loosened and dropping out long before the others appear; and on the other hand, these latter teeth often force their way through the gums and appear along side of the temporaries, without having occasioned any previous absorption of their roots.

The removal of the fangs of the deciduous teeth is effected by a sort of anticipatory process of the absorbents; but what excites these vessels into action, at this particular period, has never been ascertained.

PROPER METHOD OF DIRECTING IT.

There is nothing, as it regards the beauty, health, and durability of the permanent teeth, more to be dreaded, and, at the same time, more easily prevented, than an irregularity in their arrangement. It always occasions a more or less striking deformity in the features of the face, according to its nature and extent, and always increases the liability of the teeth to decay.

It is important, therefore, that the state of the mouth, during the dentition of these teeth, should be properly cared for; and, so thoroughly convinced am I of this that I hesitate not to say that, were it, at this time, properly attended to, there would not be one decayed tooth where now there is a dozen.

Much harm, it is true, may be done by an improper meddling with the teeth at so early a period, but this, so far from inducing us to neglect them altogether, should only make us more careful to whom we confide their management.

For the right direction of second dentition, it is necessary that much judgment should be used, and that the formation, growth, size, and relative position of the teeth in the maxillæ, be well understood. All unnecessary interferences with the parts concerned in the production of these organs, should certainly be avoided, since they will only tend to mar the perfection at which nature ever aims. The legitimate duty of the physician being, as Mr. Bell remarks, "the regulation of the natural functions when deranged," he should never

anticipate the natural removal of the temporary teeth, unless their extraction is called for by some pressing emergency, such as a protrusion of the permanent ones in an improper place, alveolar abscess, or an exfoliation of the alveolar processes.

First dentition has received its due share of attention from medical men, but that of the adult teeth has been almost entirely overlooked by them, because, the management of it has never been considered as constituting any of the duties that belong to their department of medicine. Nor has it been accurately described by dentists generally, because, a knowledge of physiological science, which alone can qualify them for such a task, seldom constitutes any part of their professional acquirements.

Among the few, who have treated this subject in a proper manner, I must mention and recommend M. Delabarre, whose work is almost the only one that contains full information in regard to it. Fox, Duvall, and Bell, have bestowed some attention upon it, but not so much as its importance demands.

The superficial manner in which second dentition is so frequently studied by dentists, led M. Delabarre to remark, "That the laws which govern the expansion, growth, and arrangement of the teeth, are properly the patrimony of the physician, who should understand them, in order to direct the dentist whenever (which unfortunately is very frequently the case) he is not furnished with sufficient information on all the duties of his profession."

The mouth should be frequently examined from the time the molting of the deciduous teeth commences,

until the second set are complete; and when the growth of the permanent teeth so far outstrips the absorption of the roots of the temporary teeth, that they are caused to take an improper direction, the primitive teeth, that have occasioned the obstruction, should be immediately removed. In the dentition of the upper front teeth, this should never be neglected; for, when they come out behind the temporaries, as in such cases they most frequently do, and are permitted to advance so far as to fall on the inside of the lower incisors, a permanent obstacle is offered to their subsequent proper adjustment.

When a wrong direction has been thus given to the growth of the lower front teeth, they are rarely prevented from acquiring their proper arrangement by an obstruction such as that last noticed. They should not, however, on this account, be allowed to occupy a false position too long, for the evil will be found much easier of correction while recent, than after it has continued for a considerable length of time. The impediment should, therefore, be immediately removed.

The permanent central incisors of the upper jaw, are much larger than those of the temporaries of the same class. It might, therefore, be supposed, that the aperture formed by the removal of the one, would not be sufficient for the admission of the other, without an increase in the size of this part of the maxillary arch. It should, however, be recollected that, by the time these teeth usually emerge from the gums, the crowns of the temporary lateral incisors are so much loosened by the absorption of their roots, that they yield sufficiently to the pressure of the new teeth, to admit of their taking their proper positions within the dental circle. When

this, however, does not happen, the temporary laterals should be extracted.

Under similar circumstances, a similar course should be pursued with the permanent lateral incisors and the temporary cuspidati, and with the permanent cuspidati and the first bicuspidates.

The bicuspidates being situated between the fangs of the temporary molares, are seldom caused by them to take an improper direction in their growth. Neither are they, for want of room, often prevented from coming out in their proper places.

In the management of the dentition of the adult teeth, much will depend on the experience and judgment of the practitioner. If he be properly informed upon the subject, and gives to it the necessary care and attention, the mouth will, in most instances, be furnished with a healthy, well arranged, and beautiful set of teeth. At this time, "an opportunity," says Mr. Fox, "presents itself for effecting this desirable object," (the prevention of irregularity,) "but every thing depends upon a correct knowledge of the time when a tooth requires to be extracted, and also of the particular tooth, for often more injury is occasioned by the removal of a tooth too early, than if it be left a little too long; because a new tooth, which has too much room long before it is required, will sometimes take a direction more difficult to alter, than a slight irregularity occasioned by an obstruction of short duration.

Mr. Bell objects to the extraction of the temporary teeth, especially in the lower jaw, to make room for the permanent ones, on the ground that it is harsh and unnatural—that it often gives rise to a contraction of

the maxillary arch, and that it, in consequence of the peduncular connection that exists between the necks of the temporary teeth and the sacs that surround the crowns of the permanent ones, interferes with the uniform deposition of the enamel.

These objections are certainly very forcible, and should deter every dentist from adopting the practice, except as a dernier resort—the least of two evils. But when the temporary teeth, by remaining too long are likely to affect the arrangement, and, consequently, the health of the permanent ones, they should be extracted; because, in that case, their presence is an evil greater than any that would be occasioned by their removal. This last objection, however, can only apply to the extraction of the temporary teeth, before the formation of the enamel. As a general rule they should be suffered to remain as long as they are not an injury to the permanent teeth and their contiguous parts.

When the permanent teeth are much crowded, the lateral pressure is frequently so great that their enamels are fractured. If this cannot be avoided, in any other way, one of the permanent teeth on each side should be extracted; for it is better to sacrifice two than permanently to endanger the health of the whole.

M. Delabarre, in cases where the crowding is not very great, recommends the passing of a file between the teeth; as also does Mr. Bell, when only the space that is usually occupied by a half of a tooth, is required.

Notwithstanding the deservedly high authority of these two gentlemen, my own experience compels me to reject the practice. The apertures thus formed by

the file, soon close, but not so perfectly as to prevent small particles of extraneous matter from getting in between the teeth, and being retained there until they become putrid, vitiating the mucous and salivary secretions of the mouth, and thus occasioning the decay of the teeth. In this manner, I have sometimes known the front teeth to be entirely destroyed; and I have always observed, that those teeth which had been thus filed, were invariably the first, and sometimes the only ones, that became carious, thus clearly indicating the cause of their decay.

I do not, however, wish to be understood as conveying the idea that filing the teeth necessarily causes them to decay, for, when the file is used for any other purpose than to gain room, the apertures may be made large enough to prevent their approximation, and thus, all the injuries apprehended from the operation will be prevented.

The file should, therefore, never be used with a view to remedy an irregularity, the extraction of two teeth, one on each side of the jaw, however small the space required to be gained may be, is far preferable. The second bicuspid, *ceteris paribus*, should always be removed rather than the first, but sometimes, the extraction of the first becomes necessary. The extraction of these, however, should never be determined on, when the evil can be corrected by the removal of the others.

By the removal of two teeth, ample room will be gained for the development and regular arrangement of all the remaining ones, and the injuries that usually result from a crowded state of these organs prevented.

On the filing of teeth, to prevent irregularity, Dr. Fitch judiciously remarks: "I consider the expediency of filing or not filing the teeth, ought to be a subject of serious deliberation on the part of the dental practitioner, and never, especially in young persons, perform the operation, unless obliged to do so, to cure actual disease.

"I was greatly surprised, in the late work of Mr. Bell, to see directions to file slightly irregular and crooked teeth, so as to gain about one half a tooth of room."

Whenever the constitution is sound and healthy, the services of the dentist will seldom be required to direct second dentition. Speaking of this, Mr. Koecker observes: "That the children, for whom the assistance of the dentist is most frequently sought, are those who are either in a delicate, or at least an imperfect constitutional health; where the state, of not only the temporary teeth, but of the permanent also, is to be considered; and, where both are found diseased, the future health and regularity of the latter require the greatest consideration of the surgeon.

"Irregularity of the teeth is one of their chief predisposing causes of disease, and never fails, even in the most healthy constitutions, to destroy, sooner or later, the strongest and best set of teeth, unless properly attended to. It is thus not only a most powerful cause of destruction to the health and beauty of the teeth, but also to the regularity and pleasing symmetry of the features of the face; always producing, though slowly and gradually, some irregularity, but not unfrequently the most surprising and disgusting appearance.

"It is, however, a great pleasure to know, that dental

surgery is abundantly provided with the most sure remedies, and in the most delicate subjects, if placed under proper care, at an early age, the greater portion of the teeth of the permanent set may invariably be preserved in perfect health and regularity, in common with their relative and contiguous parts."

Finally, we remark, that though nature is most generally able to complete the task assigned her, yet there are times when she requires aid, and it is then, and then only, that the services of the dentist are needed. Therefore, whilst, on the one hand, we should guard against any uncalled for interference, we should, on the other, always be ready to give such assistance, as the nature of any disturbance presented to our notice, may require.

CHAPTER V.

IRREGULARITIES OF THE TEETH—THEIR TREATMENT.

THE increased number of teeth, their larger size, and other circumstances, attending second dentition, often give the teeth of the second set an improper direction, and occasion much irregularity in their arrangement. But this rarely affects the deciduous teeth; because, unlike the others, they seldom meet with any obstacles to their ascent and final protrusion through the gum.

A disproportion between the size of the permanentes, and the anterior part of the jaw, sometimes prevents the teeth from taking their proper places in the dental circles; but this seldom occurs, and even when it does, it is generally so inconsiderable, that it occasions but little disturbance. Irregularity is most frequently produced by a premature loss of one or more of the temporaries, and a consequent contraction of the maxillæ, by an incongruity between the absorption of the fangs of the first denture and the growth of the second teeth, and by the presence of supernumerary teeth.

The first of these causes, is probably the most frequent. The second often occasions such disturbances in the arrangement of the teeth, as are very difficult to remedy. The last is of rare occurrence, but when it does happen, it produces the worst kind of irregularity.

Irregularity is generally confined to the incisors and cuspidati, though it sometimes extends to the bicuspidēs, and even to the dentes sapientiæ, but rarely to the first and second molares. These two latter classes of teeth like the temporaries, meet with no obstructions to their ascent and protrusion through the gums. But the incisors, cuspidati, and bicuspidēs, often make their appearance before the roots of the temporary teeth, immediately over them, have been absorbed; and even when the crowns of the deciduous teeth fall out before they appear, they are so much larger than the temporaries, that the space thus made is frequently not large enough for their reception.

The first molares, are the first of the second denture, that are cut; and hence, the teeth that are to fill the anterior part of the arch, are limited to the space occupied by the first set, and if this is too small, a slight irregularity, at least, must of necessity ensue.

The dentes sapientiæ are sometimes prevented from coming out in their proper places, in the lower jaw, by a want of room between the second molares and coronoid processes; and in the upper, by a want of space between the second molares and the angle of the jaw.

When a bicuspid cannot occupy its proper place, it turns inward towards the tongue, or outward towards the cheeks, according as it is in the lower or upper jaw. But this order is sometimes reversed. It is com-

paratively seldom that the harmony of the arrangement of these teeth is disturbed, and when it is, the derangement is generally much less than that to which the incisors and cuspidati are liable.

These latter teeth are frequently so much disturbed in their dentition that they are entirely excluded from the arches. In such a case they seldom appear behind it, but are usually thrown outwards towards the lips, to which they often are a source of great annoyance, by causing them to protrude, and sometimes excoriating the delicate membranes with which they are lined to such an extent that their extraction becomes indispensable. Besides this, they always occasion more or less deformity, and when they protrude a great deal, they are apt, on the reception of a blow, to cut the upper lip.

The incisors of the upper jaw, present a greater variety in the manner of their arrangement than any of the other classes of teeth. The centrals sometimes appear before the dental circle, but much more frequently behind it: at other times, their lateral edges are turned either directly or obliquely towards the lips. The irregularity of these teeth, however, is much more generally characterized by an overlapping of their sides.

The laterals sometimes appear half an inch behind the arch, in the roof of the mouth, and sometimes before it. At other times, their sides are situated like those of the centrals, just described.

When any of the upper incisors are very much inclined towards the interior of the mouth, the lower ones, at each occlusion of the jaws, shut before them, and thus become an obstacle to their adjustment. This is one of the most difficult kinds of irregularity to remove,

and one that often interferes with the lateral motion of the jaws.

The under front teeth sometimes shut in this manner even when there is no deviation of the upper to the interior. Here the irregularity is owing to a preternatural elongation of the lower jaw, which more frequently results from some fault in the dentition of the second denture, than from any defect congenital with the jaw itself.

Sometimes, the superior maxillary arch is so much contracted, and the front teeth in consequence so much projected, that the upper lip is prevented from covering them. Cases of this kind, however, are of rare occurrence, but when they do occur they occasion much deformity of the face, and are a species of irregularity very difficult to remedy.

From the same cause, the lateral incisors are sometimes shut out from the row, and appear behind the centrals and cuspidati, the dental circle being filled up with the other teeth.

There are many other deviations in the arrangement of these teeth. Mr. Fox mentions one that was caused by the presence of two supernumerary teeth of a conical form, that came up partly behind and partly between the central incisors, which, in consequence, were thrown forward, while the laterals were placed in a line with the supernumeraries; the central incisors, though half an inch apart, thus formed one row and the laterals and supernumeraries, another. Mr. F. says, he has seen three cases of this kind.

This description of irregularity, is rarely met with, I have, however, in the course of my observations seen several cases.

Cases are occasionally met with, says M. Delabarre, of a transposition of the germs of the teeth, so that a lateral incisor takes the place of a central, and a central the place of the lateral. A similar transposition of a cuspidatus and a lateral incisor sometimes also occurs.

The incisors of the under jaw, being smaller than those of the upper, and in other respects less conspicuous, do not so plainly show an irregularity in their arrangement, nor are they so much affected by it. Still it should be guarded against, for any such disturbance, whether in the upper or lower jaw, is productive of injury to the health of the teeth, and to the beauty of the mouth.

The growth of the inferior permanent incisors is sometimes more rapid than the absorption of the roots of the temporary. In such a case, the former emerge from the gums behind the latter, and sometimes so far back, that they very much annoy the tongue, and interfere with the enunciation. At other times, the permanent centrals cannot come into their proper places, because the space left for them by the molting of the temporaries, is insufficient for their reception. The irregularity in the former of these two cases, is greater than in the latter. The same causes, in like manner, affect the laterals.

M. Delabarre mentions a defect in the natural conformation of the jaws, by which the upper frontal temporaries on one side of the medial line are thrown on the outside of the lower teeth, while the similar teeth, on the other side of the same line, fall within. The same disposition, he says, may be expected, unless

the defect be previously remedied, after the dentition of the permanent teeth.* I have never met with more than two cases of this sort, and I did not see the subjects of even these, until after they had become adults.

THEIR TREATMENT.

THE efforts that are made to remedy or remove the irregularities of the teeth, should always be in strict accordance with the indications of nature. Whenever the permanent teeth are prevented from taking their proper places, she endeavors to correct the evil, and if foiled in her efforts, exerts herself for their destruction. But at what period these efforts cease, is somewhat difficult to determine. When the irregularity is neither great nor complicated, and its causes are removed before the nineteenth or twentieth year, the teeth of themselves soon find their proper positions.

When, however, the exertions of the economy are unavailing, recourse should be had to the aid of the dentist, which, if properly rendered, can in almost every case, produce symmetry and regularity from deformity and confusion.

* Enfin il y a une espèce de torsion de l'une ou de l'autre mâchoire, et quelquefois de toute les deux, qui fait que les dents temporaires supérieures antérieures recouvrent les inférieures, d'après la meilleure disposition; tandis qu' à commencer de la ligne médiane, les semblables dents de l'autre côté, rentrent en dedans des inférieures; il est probable, dans ce cas, que si l'on n'y obvie, la même disposition se reproduira pour la seconde dentition.—*Traité De La Seconde Dentition*, p. 136.

The practicability of altering the position of a tooth, after the completion of its growth, was well known to many of the earlier practitioners; but, as before the commencement of the present century, the more particular object of the dentist was, the insertion of artificial teeth, this branch of dentistry met with but little attention. Fauchard and Bourdet, were among the first who turned their attention to it. They invented a variety of fixtures for adjusting such of the teeth as were not rightly arranged; but most of these were so awkward in their contrivance, and occasioned so much inconvenience to the patient, that their use was soon abandoned.

Mr. Fox, whose name must ever hold a distinguished place in the catalogue of those who have contributed most largely to this department of surgical science, was the first to give explicit directions for remedying the irregularities of the teeth. These have formed the basis of the established practice for the last twenty-five or thirty years, and this long trial has proved that they were founded upon a knowledge of the laws of the economy, and much practical experience.

In describing the treatment for irregularity, I shall notice the means, by which some of its principal varieties may be removed; otherwise, the application of the principles of treatment would not be well understood, since it must be varied to suit each individual case.

Whenever any irregularity is discovered in the second denture, the sooner it is rectified the better, for, in general, the longer a tooth is allowed to occupy a wrong situation, the more the difficulties of its adjustment will be increased. The position of a tooth may some-

times be altered, after the fourteenth or fifteenth year, but generally, it is better not to delay the application of the means until so late a period. For a change of this kind may be much more easily affected, before the several parts of the osseous system have acquired their full size, and while the process of new formation is in vigorous operation, than it can be after the osseous growth has been completed.

If, previously to this time, there be any pressure against a tooth, it causes an absorption of the side of the alveolus against which its fang is pressed. But this does not necessarily destroy the socket, for as the internal paries is carried off by the absorbents, the external of the same side is thickened by a deposition of new bone; and the vacuum thus made on the opposite side, is also filled up.

Though this pressure, at a later period of life, would occasion an absorption of the alveolus, there would be no corresponding osseous deposition; and thus, not only would the tooth be loosened, but a morbid diathesis would be induced in the periosteum of its fang, in the alveolar membrane, and in the gum, which would, in all probability, very much injure the other teeth.

The age of the subject, therefore, should always govern us in forming a prognosis of the practicability of removing an irregularity. Previously to the fifteenth year, we may almost always form a favorable one, but after this time, our efforts will be less likely to succeed.

The first thing that should claim our attention in the treatment of these deviations, is the removal of their causes. Whenever, therefore, the presence of any of the temporaries has given a false direction to one or

more of the permanent teeth, they should be removed, and the thumb or finger should, from time to time, be properly pressed upon the teeth thus wrongly situated. This, if the irregularity has been occasioned by the remaining of a deciduous tooth, will, generally, be all that is requisite.

But, when it is the result of a narrowness of the jaws, either natural or acquired, one of the secondary teeth on each side of the jaw should be removed, in order to make room for the admission of those that are improperly situated. The second bicuspid is the tooth that is generally extracted, and its place is soon filled up by the falling back of the first, which usually makes ample room for the adjustment of the cuspidati and incisors. But if the first bicuspid, of themselves, do not fall back into the stations made for them, a ligature of silk should be tied round them and the first molars, which should be renewed every two or three days, until the desired result is produced.

The most frequent kind of irregularity resulting from a narrowness of the jaws, is the projection of the cuspidati. These teeth, with the exception of the second and third molars, are the last of those of the second denture that are cut, and are consequently more liable to be thrown out of the arch than any of the others, especially when it is so much contracted as to be almost entirely filled before they make their appearance. The common practice, in cases of this kind, is to remove the cuspidati. But, as these teeth, contribute more than any others except the incisors, to the beauty of the mouth, and can, in almost every case, be brought to their proper places, the practice should certainly be discarded.

Therefore, instead of removing these teeth, room should be made for them by drawing two of the bicuspidates. Much judgment, however, is requisite to determine which class of these teeth to remove. If, between the first bicuspidates and the lateral incisors, there be spaces of one-half the width of the cuspidati, the second bicuspidates should be extracted instead of the first; but if there be no such spaces, the first should be drawn; for although these might be carried far enough back, after the removal of the second, to admit the crowns of the cuspidati between them and the lateral incisors, yet still there would not be a perfect harmony of arrangement, for the fangs of these teeth would still cross each other; so that those of the bicuspidates, would be found deeply seated in the arch, while those of the cuspidati would be thrown forward so much, that they would occasion considerable prominences in the gums that cover their alveoli; which, in consequence, would be gradually absorbed, and thus the teeth would be loosened and caused to drop out.

But when there are spaces such as have been just described between the lateral incisors and first bicuspidates, a disturbance of this kind will never occur, and when this is the case, the first bicuspidates should never be removed, unless there be an irregularity in the arrangement of the incisors that cannot be adjusted in any other way, and at the same time leave room for the cuspidati.

The first bicuspidates are next to the cuspidati in importance; hence, they should never be removed, unless it be absolutely necessary for the adjustment of the teeth occupying the anterior part of the arch.

The bicuspidates are seldom disturbed in their arrange-

ment, but when one of them is not in its proper position, and there is a considerable crowding of the teeth that are anterior to it, it should be extracted; for, although the irregularity itself may not be very conspicuous, yet a degree of pressure will be kept up between the other teeth, which must of necessity be injurious.

The treatment of irregularity of the incisors of the upper jaw, is generally more difficult and complicated than that of the lower incisors. These teeth are more conspicuous, and, when well arranged, contribute more than any others to the beauty and pleasing expression of the mouth; their preservation and regularity are, consequently, of the greatest importance. Hence, the practice of removing the laterals, when they are situated behind the centrals and the cuspidati, and when the dental arch is not completely filled without them, is one that cannot be too strongly deprecated. Without these teeth, the beauty of the mouth, however well all the others may be arranged, is incomplete. They should never be removed, unless their arrangement, and that of the other teeth, are such, that their adjustment is impossible.

One of the most difficult kinds of irregularity to rectify, is, when the central incisors are so situated that their cutting edges, instead of being in a line with the arch, form an angle with it of from forty-five to ninety degrees. This peculiarity is rarely met with in both centrals, but often in one, while the other occupies its proper position.

Some practitioners have recommended, when the space between the lateral incisors is equal to the width of the crooked centrals, to correct this species of irre-

gularity, either by twisting the centrals suddenly round with a pair of forceps, or by extracting and immediately replacing them in a proper position.

I cannot, however, join in these recommendations, because, if a tooth be extracted, or forcibly and suddenly turned in its socket, the dental vessels, from which its living principle is derived, are severed, and though its alveolar connection may be partially re-established, and an imperfect degree of vitality thus kept up, yet it will ever after be deprived of the animation and brilliancy which are peculiar to healthy teeth; a morbid diathesis in the relative and contiguous parts will be induced, which will end not only in the destruction of the tooth, but also in the great injury of the adjacent teeth.

These teeth, moreover, in consequence of the transverse being greater than the horizontal diameter of their fangs, can neither be suddenly twisted in their sockets, nor taken out and replaced with their labial surfaces outward, without great injury to the alveoli.

This description of irregularity, however, may be rectified in the following manner, without being attended with any of the evils above described. For this purpose, a gold band should be made and accurately fitted to the tooth. Ligatures are then to be attached to the sides of it, that will front the exterior and interior part of the mouth, after it shall have been placed upon the tooth. The ligature on the interior part of the band, should be brought forward between the irregular tooth and the lateral incisor, and then carried, on the outside of the circle, back to the first or second bicuspid, to which it should be made fast. The ligature

attached to the anterior part of the band should be taken back between the centrals, and then extended, on the inside of the arch, to the cuspidati or the first bicuspid, on the opposite side of the jaw, to which it also should be secured. These ligatures should be renewed every two or three days, and each succeeding one drawn a little tighter than the preceding, until the tooth be properly adjusted.

If both the central incisors are affected with this species of irregularity, we should wait a few weeks after adjusting one of them, until it becomes firmly fixed in its socket, before we attempt to move the other, lest the pressure of the ligature against the newly adjusted tooth should throw it back into its former position.

The band should be so adapted to the tooth, that it may not be moved by the force that will necessarily be exerted upon it by the ligatures. It should be stamped between a metallic cast and die of the tooth; the manner of obtaining which, will be described hereafter.

Before, however, any attempt is made to adjust the tooth, it should first be ascertained, whether there is space enough between the other teeth to admit of its being turned. If there is not, room should be made, by extracting the second bicuspid, and proceeding, as has been before described.

Treatment similar to this, is also applicable to the lateral incisors, when similarly situated.

Irregularities arising from the presence of supernumerary teeth, may generally be removed by their extraction; and if this is not effectual, then properly directed pressure should also be applied.

In all cases, in which the upper teeth of the front

part of the mouth, are thrown forward and caused to project, by the narrowness of the jaws, the second bicuspidetes should be removed, unless the first molares be decayed, for then it is more advisable to draw them. The anterior teeth are, thus, allowed to fall back, and form a more regular curve. Mr. Fox, in cases of this kind, recommends, that the first bicuspidetes should be extracted, but, for reasons before stated, I think it better to remove the second.

There are other varieties of irregularities in the front teeth, but I shall only notice one, which, from its peculiar character, is sometimes exceedingly difficult to remedy. It is when one or more of the upper anterior teeth are placed so far back in the maxilla, that the under ones come before them at each occlusion of the jaws; and thus present an insuperable obstacle to their ever being remedied without the aid of art.

Of this variety, Mr. Fox enumerates four kinds:—The first is, when one of the central incisors is situated so far back, that the lower teeth shut over it, while the other central remains in its own proper place.

The second is, when both of the centrals have come out behind the circle of the other teeth, and the laterals occupy their own proper positions.

The third is, when the lateral incisors are thrown so far back, that the under teeth shut before them, while the centrals are well arranged.

The fourth kind is, when all the incisors are placed so far in, that the lower ones shut before them.

He might also have added to this variety of irregularity, a fifth kind, for it sometimes happens that the cuspidati of the upper jaw are thrown so far back, that

they drop on the inside of those of the lower. I do not, however, recollect of ever having met with more than two cases of this arrangement.

This variety of irregularity is not always occasioned by the upper teeth's being thrown too far back; it is frequently consequent upon the too great length of the under jaw.

Two things are necessary in the treatment of the irregularities which have just been described; the first, is to prevent the upper and lower teeth from coming entirely together, by placing between them some hard substance, so that the former may not be hindered by the lower teeth, from being brought forward. The second is, the application of some fixture, that will exert a constant and steady pressure upon the deviated teeth, until they pass those of the lower jaw, that obstruct them.

For these purposes various plans have been proposed. M. Duval recommends the application of a grooved or guttered plate, but I cannot determine how it was applied, or in what manner it effected the object proposed, since he has given neither drawing nor description of it. It was, perhaps, as M. Delabarre conjectures, a sort of inclined die, which was so placed over the teeth that are more exteriorly situated, that it strikes, at each occlusion of the mouth, the inside of the teeth that meet it. An instrument based upon the same principles, is also mentioned by M. Catlin. But fixtures of this kind, as has been remarked by M. Delabarre, can only be used, when there is a deviation both in the upper and lower teeth.

M. Delabarre proposes to pass silk ligatures around

the teeth, and in such a way, that a properly directed and steady force may be exerted on those that are too far back in the maxilla; while the jaws are prevented from coming in close contact, by means of metallic grates, fitted to two of the inferior molares.

This plan possesses the merit of simplicity, and occasions but little or no inconvenience to the patient; but it, sometimes, will not only be found inefficient, but also to loosen the teeth adjacent to those that are to be brought forward. The force on the irregular teeth, and those to which the ligatures are attached being equal, in opposite directions, the latter will be drawn back, while the former are being brought forward; and thus the means that are used for the correction of one evil, will sometimes be productive of another.

Of the various fixtures that have been invented, for the correction of these kinds of irregularity, that recommended by Mr. Fox is unquestionably the best. It consists of a gold bar about the sixteenth part of an inch in width, and of proportionate thickness, which is bent to suit the curvature of the mouth, and fastened with ligatures to the temporary molares of each side. It is pierced, opposite to each irregular tooth, with two holes. The teeth of the upper and lower jaw, are prevented from coming entirely together, by means of thin blocks of ivory, attached to each end of the bar by small pieces of gold, and resting upon the grinding surfaces of the temporary molares.

After the instrument has been thus fastened to the teeth, silk ligatures are passed around the teeth, that have deviated to the interior, and through the holes opposite them, and then tied in a firm knot, on the

outside of the bar. The ligatures must be renewed every three or four days, until the teeth shall have come forward far enough to fall plumb on those that formerly shut before them, and acquired a sufficient degree of firmness to prevent them from returning to their former position. But as soon as the teeth shut perpendicularly upon each other, the blocks may be removed, and the bar alone retained.

For the last twelve or fifteen years, many practitioners, both in England and the United States, have substituted golden caps for the blocks of ivory, recommended by Mr. Fox; and, instead of simply bending the bar, they now stamp it between a metallic cast and die, so that all its parts, except those immediately opposite the irregular teeth, may be perfectly adapted to the dental circle. The apparatus, with these modifications, is both more comfortable, and less liable to move upon the teeth.

Mr. Fox directs, that the blocks of ivory should be placed upon the temporary molares, but the golden caps, that are now substituted, are entirely disconnected with the bar, and are often used after the molting of these teeth, they are therefore placed upon the first permanent molares.

The caps, since the teeth are prevented from coming together, will have to perform the function of mastication. They should therefore be placed upon the stoutest teeth; and it is for this reason that the molares should be selected to wear them.

The curved bar should be removed and washed every time the ligatures are renewed. If this be neglected, the particles of food that collect between it and the

teeth, will soon become putrid and offensive, and may produce considerable inflammation in the gums.

Before we apply the apparatus, we should first ascertain whether there be sufficient space for the reception of the deviated teeth, and if there be not, room should be made in the manner before described.

Some diversity of opinion exists as to the most suitable age for removing these kinds of irregularity. Mr. Fox, it would seem, preferred the period immediately previous to the molting of the temporary molares,—probably the ninth or tenth year after birth.

Some think, that the fore part of the dental arch continues to expand until the second denture is completed, and that the bicuspidæ afford a better support for the ends of the bar than any other teeth, and are therefore content to wait until the fifteenth or even sixteenth year. But though the arch does sometimes thus expand, yet even when the expansion occurs, it is generally so inconsiderable, that very little advantage can be derived from it. Moreover, the arch, instead of expanding, is much more liable to contract, whenever a vacancy occurs in the dental circle, either by the extraction, or from the improper growth of one or more of the teeth; hence the difficulty is very apt to be increased by delay.

The evil, it is true, may be remedied at the fifteenth, seventeenth, or even eighteenth year; but yet it is never advisable voluntarily to defer it to so late a period.

The most that is required in the treatment of irregularity of the lower incisors, is to remove a tooth, and to apply frequent pressure to the teeth that are improperly situated. These teeth are less conspicuous than those of the upper jaw, and the loss of one of them, if the others are well arranged, is scarcely perceptible.

CHAPTER VI.

PECULIARITIES IN THE FORMATION AND GROWTH
OF THE TEETH.

IN the development and growth of the various parts of the human frame, many very curious and interesting anomalies are sometimes observed; but in no portion of it are they more frequent in their occurrence, or more diversified in their character, than in the teeth. These aberrations, however, are generally confined to the second denture; the first rarely exhibits any striking peculiarities.

The circumstances connected with the formation and growth of the second, can satisfactorily account for some of the aberrations that it exhibits; but there are others, principally in shape and size, which cannot be so easily explained.

Mr. Fox gives a drawing of a tooth, that in its shape somewhat resembled the letter S. This deformity was occasioned by an obstructing temporary tooth.

The molares of the upper jaw, sometimes, have four or even five roots, and those of the lower jaw, three; and there are other peculiarities also in the

crowns, especially in those of the class of teeth just mentioned, for which we cannot readily account.

These deviations of shape, to which the crowns of the teeth are subject, are usually confined to the molares, and consist principally of protuberances upon their sides, that very much resemble supernumerary teeth of a conical shape. These irregularities may perhaps be occasioned by an action somewhat similar to that which takes place in the temporary teeth, when the permanent pulps are given off, or by a partial rupture, at an early period, of the dental capsules, and a consequent protrusion of the pulps, or by an original defect in their conformation.

The next peculiarity to be noticed, is that of size, and in this respect the teeth are very variable. Even in the same mouth, the want of relative proportion between the different classes of teeth, is sometimes quite conspicuous. But instances of this kind are not very frequent, for where there is an increase or diminution in the size of the teeth of one class, there is generally a correspondent change in those of the other.

Aberrations of this character are probably dependent upon some diathesis of the general system, whereby the teeth, during the earlier stages of their formation, are supplied with an excessive or diminished quantity of nutriment.

Some very astonishing deviations have been known to take place in the growth of the teeth. The most remarkable case on record, is that narrated by Albinus: "Two teeth," says he, "between the nose and the orbits of the eye, one on the right side, and the other on the left, were enclosed in the roots of those processes that

extend from the maxillary bones to the eminences of the nose. They were large, remarkably thick, and so very like the canini, that they might have seemed to be these teeth themselves which had not before appeared; but the canines themselves were also present, more than usually small and short, and placed in their proper sockets. The former, therefore, appear to have been the new canini, which had not penetrated their sockets, because they were situated where these same teeth are usually observed to be in children. But what is still more remarkable, their points were directed towards the eyes, as if they were the new eye teeth inverted. And they were also so formed, that they were, contrary to what usually happens, convex on the posterior, and concave on the anterior.”* A case of a somewhat similar character is mentioned by Mr. John Hunter.

The following case is in the words of Mr. G. Wait: “While I was prosecuting my anatomical studies, I was struck with the appearance of a cuspidatus of the upper jaw; it was short, and appeared as if the body of the tooth was in the jaw, and that it was the tip of the root that presented itself. Upon further examination, I found this verified; and after the cranium and lower jaw were properly macerated and cleansed, I found one of the lower bicuspidēs in the same manner.”

* “Dentes duo inter nasum et orbes oculorum, dexter sinisterque, inclusi in radicibus processum quibus ossa maxillaria ad eminentem nasum pertinent. Longi sunt, crassitudinis insignis. Similes maximi caninis, ut videri possint illi ipsi esse, non nati. At aderant præterea canini præter consuetudinem parvi, et breves, suis infixi alveolis. Itaque videantur esse canini novi, qui non eruperint uptote ibi loci collocati, ubi sunt novi illi in infantibus. Sed quod miremur sursum divecti, tanquam si sint canini novi inversi. Et ita quoque formati sunt ut, contra quam alii, a posteriore parte gibbi, ab anteriore sinuati sint,” &c.—*Academ. Anastat. Liber 1*, p. 54.

I can readily imagine that a cuspidatus of the upper jaw might, while in a rudimentary state, be so altered in its position, that it would pass up between the nose and the orbit. But that the crown, after having been thus turned round in the socket, should remain stationary, while the fang passed down and appeared outside of the gum, is a most extraordinary and remarkable anomalism. In the former instance the tooth could still continue to derive the nutriment necessary to its growth and vitality from the dental vessels; but in the latter case, it could not, because the apex of the root, the place where the vessels and nerves enter, would be entirely without the gum.

The following is one of several cases of deviation in the growth of the teeth, that have come under my own observation. About three years ago, I was requested to extract a tooth for a lady of this city, under the following circumstances. She had, for a time, experienced a good deal of pain in her upper jaw, and supposed it to originate from the second molaris of the right side, although this tooth was perfectly sound at the time. Meanwhile, her general health became impaired, and her attendant physician, thinking that the local irritation might have contributed to her debility, advised her to have the tooth removed. On its extraction, the cause of the pain became at once apparent. The *dens sapientiæ*, which had hitherto not appeared, was discovered with its fangs extending back to the utmost verge of the angle of the jaw; while its grinding surface had been in contact with the posterior surface of the crown and neck of the tooth that had been just extracted. On the removal of the wisdom tooth,

the pain in that jaw ceased, but I have never ascertained what effects were produced, by the operation, upon her general health.

OSSEOUS UNION OF THE TEETH.

Though I never doubted the possibility of an osseous union of the teeth, yet it is but a few months since I first met with an instance of it.

During a visit to the city of Richmond, I was consulted in my professional capacity, by Mr. D. and Mr. A. On examining the mouth of the former of these gentlemen, I discovered that the crowns of the central incisors of the upper jaw were perfectly united, their posterior surface presenting the appearance of one broad tooth; while their anterior or labial faces, had the same semblance as the like sort of teeth usually have. In the other gentleman's mouth I found the anterior surfaces of the right central and lateral of the lower jaw united in a similar manner; while the posterior phases of the same teeth were entirely disconnected. These being the first cases of the kind that I had seen, I wished Mr. F. B. Chewing, a respectable dentist of Richmond, also to examine them, and obtained permission for him to do so.

Mr. I. D. McCabe, (formerly of Fredericksburg, Va.) a dentist of high standing, and of unquestionable veracity, informed me, in a conversation that I had with him some time since, that he had met with a case of osseous union between a second bicuspid and first mo-

laris of the lower jaw, which was so palpable, that there could have been no doubt of its existence.

Mr. Fox has given the drawings of four cases, the originals of which, as Mr. Bell tells us, are still to be seen in the museum of Guy's Hospital. Mr. B. also informs us that he himself has seen four cases.

Mr. Koecker is skeptical on the existence of osseous union, and attributes to those, who assert that they have met with cases of it,—“a weak credulity,—a love of the marvelous,—or a desire to impose upon the world.” There is no one who entertains a higher opinion of Mr. K. as a practitioner, than myself, yet I think that he has here manifested a want of suitable respect, not for hypothetical opinions, but for the credibility of a man (Mr. Fox) whose veracity has never before been called in question.

Cases of this kind, it is true, are of very rare occurrence, and a connection of the fangs of two teeth, by an intervening portion of the alveoli, is very easily mistaken for an osseous union of the roots themselves. A few years since, in extracting a second molaris of the upper jaw, I brought the dens sapientiæ along with it. At first I thought there was an osseous union of their roots, but upon close examination, I found a very thin portion of their alveolar paries between, to which their roots were firmly attached. Such a case as this would, in many instances, be very apt to be set down as an example of osseous union.

We can easily account for a *lusus naturæ* of this kind, by supposing a previous union of the pulps of the two teeth. But from the order in which the teeth are cut, some classes appearing long before others, it would,

on this supposition, seem that it could only occur between the central incisors. It is not, however, thus limited. The central and lateral—the bicuspidēs,—the two molares, are sometimes also thus united.

An osseous union of the teeth, is fortunately of rare occurrence; for otherwise it would be productive of many accidents in the extraction of teeth. Apart from this latter consideration, it can be of but little importance, either to the practitioner, or to the physiologist.

SUPERNUMERARY TEETH.

The production of supernumerary teeth is generally confined to the anterior part of the mouth, and much more frequently to the upper than to the lower jaw. They sometimes, however, appear as far back as the *dentes sapientiæ*, and Hudson says he has seen them even farther. I have now in my anatomical collection, two supernumerary teeth that were extracted, one from behind, and the other at the side, of one of the upper wisdom teeth, by F. B. Chewing, surgeon dentist, of Richmond, Va.

These teeth are formed, as their pulps are given off from the temporary rudiments, in the same manner as those that properly belong to the permanent set.

The crowns of the supernumeraries, that appear in the anterior part of the mouth, are generally of a conical form, situated between the central incisors, and have short, knotty roots. They sometimes bear so strong a resemblance to the other teeth, that it is diffi-

cult to distinguish them. I once saw two right lateral incisors in the lower jaw, both of which were so well arranged, and perfectly formed, that it was impossible to determine which of the two ought to be considered as the supernumerary. Mr. Bell mentions a case, in which there were five lower incisors, all of which were well formed, and regularly arranged. I also have met with several cases in which supernumerary teeth in the lower jaw, so closely resembled the natural incisors, that no differences could be discerned between them.

Supernumerary cuspidati never occur, but supernumerary bicuspidates are sometimes met with. M. Delabarre says, he has seen them; and I myself have twice met with these cases. In both of these instances the teeth were very small, not being more than one-fourth as large as the natural bicuspidates, with oval crowns, and placed partly on the outside of the circle, and partly between the bicuspidates. I extracted one of them, and have it still in my possession. Its root is short, round, and nearly as thick at its extremity as it is at the neck of the tooth.

The supernumerary teeth, that appear further back than the bicuspidates, are derived from the pulps of the permanent molares, to one of which (the third) they, though much smaller in size, bear a strong resemblance.

This sort of teeth possess a peculiarity, for which it may seem somewhat hard to account. Although they are generally imperfect in their formation, yet they are much less liable than natural teeth to decay. This, however, is to be attributed to the fact, that they possess a lower degree of vitality, are much harder, and

consequently not susceptible to the action of what we consider as the usual causes of decay.

The presence of these teeth, as has been before remarked, sometimes, though rarely, occasion great irregularity in the arrangement of the others. And even when they do not produce this effect, they should, as soon as their crowns have completely emerged, be removed; because of the disagreeable appearance they are apt to give the mouth. If their extraction is too long neglected, some difficulty will be experienced in bringing the other teeth sufficiently close together to fill up the gape that will be made in the dental circle.

THIRD SET OF TEETH.

That nature does sometimes make an effort to produce a third set of teeth, is a fact, which, however much it formerly might have been disputed, is now so well established, that no room is left for cavil or doubt.

The following interesting particulars are taken from *Good's Study of Medicine*.

"We sometimes, though rarely, meet with playful attempts on the part of nature, to reproduce teeth at a very late period of life, and after the permanent teeth have been lost by accident, or by natural decay.

"This most commonly takes place between the sixty-third and eighty-first year, or the interval, which fills up the two grand climacteric years of the Greek physiologists; at which period the constitution appears occasionally to make an effort to repair other defects than lost teeth. * * * * *

“For the most part, the teeth, in this case, shoot forth irregularly, few in number, and without proper fangs, where fangs are produced without a renewal of sockets. Hence, they are often loose, and frequently more injurious than useful, by interfering with the uniform line of indurated and callous gums, which, for many years perhaps, had been employed as a substitute for the teeth. A case of this kind is related by Dr. Besset, of Knayton, in which the patient, a female in her ninety-eighth year, cut twelve molar teeth, mostly in the lower jaw, four of which were thrown out soon afterwards, while the rest, at the time of examination, were found more or less loose.

“In one instance, though never more than one, Mr. Hunter witnessed the re-production of a complete set in both jaws, apparently with a renewal of their sockets. ‘From which circumstance,’ says he, ‘and another that sometimes happens to women at this age, it would appear that there is some effort in nature to renew the body at that time.’

“The author of this work once attended a lady in the country, who cut several straggling teeth at the age of seventy-four; and, at the same time, recovered such an acuteness of vision, as to throw away her spectacles, which she had made use of for more than twenty years, and to be able to read with ease the smallest print of the newspapers. In another case, that occurred to him, a lady of seventy-six, mother of the late Henry Hughes Eryn, printer of the journals of the House of Commons, cut two molares, and at the same time completely recovered her hearing, after having for some years been so deaf as to be obliged to put the clapper

of a small hand-bell, which was always kept by her in order to determine whether it rung or not.

“The German Ephemerides contain numerous examples of the same kind; in some of which, teeth were produced at the advanced age of ninety, a hundred, and even a hundred and twenty years. One of the most singular instances on record, is that given by Dr. Slade, which occurred to his father; who, at the age of seventy-five, re-produced an incisor, lost twenty-five years before, so that, at eighty, he had, hereby, a perfect row of teeth in both jaws. At eighty-two, they all dropped out successively; two years afterwards, they were all successively renewed, so that, at eighty-five, he had at once an entire set. His hair, at the same time, changed from a white to a dark hue; and his constitution seemed, in some degree, more healthy and vigorous. He died, suddenly, at the age of ninety or a hundred.

“Sometimes, these teeth are produced with wonderful rapidity; but, in such cases, with very great pain, from the callosity of the gums, through which they have to force themselves. The Edinburgh Medical Commentaries supply us with an instance of this kind. The individual was in his sixty-first year, and altogether toothless. At this time, his gums and jaw-bones became painful, and the pain was at length excruciating. But, within the space of twenty-one days from its commencement, both jaws were furnished with a new set of teeth, complete in number.”

A physician of this city informed me, about twelve months since, that a case of third dentition had come under his own observation. The subject of it was a

female, who, at the age of sixty, cut an entire set in each jaw, and distinctly recollected the periods at which the preceding sets were cut.

The following letter from Dr. McCabe, presents another interesting case:

"DEAR HARRIS,—I have just seen a case of third dentition. The subject of this 'playful freak of nature,' as Dr. Good styles it, is a gentleman residing in the neighborhood of Coleman's mill, Caroline county, Va. He is now in his seventy-eighth year, and, as he playfully remarked, 'is just cutting his teeth.' There are eleven out, five in the upper, and six in the lower jaw. Those in the upper jaw, are two central incisors, one lateral, and two bicuspides, on the right side. Those in the lower, are the four incisors, one cuspidatus, and one molaris. Their appearance is that of bone, extremely rough, without any coating of enamel, and of a dingy brown color. Yours, &c.

JAMES D. McCABE."

Two cases, somewhat like those above mentioned, have come under my own observation. The subject of the first, was a shoemaker, Mr. M. of this city, who cut a lateral incisor and cuspidatus at the age of thirty. Two years before this time, he had been badly salivated, and, in consequence, lost four upper incisors, and one cuspidatus. The alveoli of these teeth were caused to exfoliate, and, at the time I first saw him, were entirely detached from the jaw-bone, and barely retained in the mouth by their adhesion to the gums. On removing them, I found two white bony protuberances, which, on examination, proved to be the crowns of an incisor

and a cuspidatus. They were perfectly formed, and though they have never grown so long as the other teeth, yet, up to the present time, they have remained very firm in the jaw. The teeth, that he had lost by salivation, were preserved, and are now in my possession. They are large, and have all the characteristics of those of the second denture.

The subject of the other case, was a lady, residing near Fredericksburg, Va., who cut four right central incisors of the upper jaw successively. One of her temporary teeth, in the first instance, had been permitted to remain too long in the mouth, and a permanent central incisor, in consequence, came out before the dental arch. To remedy this deformity, the deciduous incisor was, after some delay, removed; and, about two years after, the permanent tooth, not having fallen back into its proper place, was also extracted. Another two years having elapsed, another tooth came out in the same place, and in the same manner; and, for similar reasons, was also removed. To the astonishment of the lady and her friends, a fourth incisor, affected with the same irregularity, made its appearance two years and a half after the extraction of the first permanent tooth. When it had been out about eighteen months, I was called in by the lady, who wished me, if possible, to adjust it. Finding that it could not be brought within the dental circle, I advised her to have it extracted, and an artificial tooth inserted in its stead.

I only saw one of the teeth that had been previously extracted; it was well developed, and I was informed that the others were equally perfect. All the circumstances, connected with these successive dentitions,

were distinctly recollected both by the lady herself and by her friends.

It would seem, that the efforts made by nature for the production of a third complete set of teeth, are usually so great, that they exhaust the remaining energies of the system; for occurrences of this kind are generally soon followed by death.

CHAPTER VII.

DISEASES OF THE TEETH—CRIES—ITS CAUSES—
TREATMENT, &c.

HAVING before presented a brief view of the operations of nature, as well as some of her freaks, in the production of the teeth, I shall now proceed to the consideration of the diseases to which they are liable, and shall endeavor, briefly and concisely, to describe the probable causes of them, and such modes of treatment as my own experience, aided by the best authorities, have suggested.

CRIES—DECAY.

There is no disease, to which the teeth are liable, of more frequent occurrence, or more fatal in its tendency, than caries. So insidious and rapid is it in its attacks, that whole sets of these invaluable organs are frequently involved in irreparable ruin, before there has been scarcely any intimation of its presence. It is no un-

common thing for sets of the most beautifully formed teeth to crumble away one after another, in such quick succession, that in one or two years after the decay was first observed, there are no traces of their former existence, except a few spiculated fangs.

This disease usually first manifests itself by an opaque or dark spot on the enamel. If this be removed, the bone underneath will exhibit a dark brown, black, or whitish appearance, according to the density of the tooth, upon which it has been formed. It always commences upon the outer surface of the tooth, usually under the enamel, and thence proceeds towards the centre, until it reaches the lining membrane.

If the caries is of a soft and humid character, the enamel, after a time, usually breaks away and discovers the ravages it has committed on the bony structure of the tooth. But this does not always happen, for the enamel sometimes remains nearly perfect; until the whole bony structure within has been destroyed.

There is no portion of the crown or neck of the tooth exempt from this disease, for, though particular parts only are subject to its attacks, yet, when it has once commenced, it generally continues until both crown and neck are destroyed.

The parts, on which it usually primarily appears, are—the depressions upon the grinding surfaces of the molares—the necks and sides of teeth pressing on each other—the posterior surfaces of the upper incisors, especially those of the laterals, and the outer and inner surfaces of the molares, whenever (which frequently happens) there is any impaction in the enamel.

The enamel, being much harder than the osseous part of the tooth, is rarely affected by decay. Caries does, however, sometimes attack it near the gum, and notwithstanding its density, penetrates to the subjacent bone. It sometimes commences only in a point; at other times, a number of spots appear, which gradually spread until they unite.

The appearance and consistence of caries is various. In teeth that are very dense, it is hard, and of a dark brown color, bordering on a black. In those that are of a loose spongy texture, it is soft, of a much lighter color, very humid, and easily penetrated by the saliva.

It is, no doubt, because of the supposed resemblance that this latter description of decay bears to a particular disease of the other bones, that the name caries has been applied to this disease.

There is certainly but a slight resemblance to support this application of the term, but, as it has been very generally sanctioned, I shall continue its use. Mr. Bell has substituted the word gangrene in its stead, which he thinks conveys a more correct idea of the true nature of the disease. The applicability of this latter term had before been suggested by Hunter, who remarks: "That the most common disease to which the teeth are liable, is such a decay or waste as appears to deserve the name of mortification." Mr. Fox also speaks of the decay of the teeth, as a disorder which terminates in mortification; but he always, while treating of it, designates it by the term, caries. We prefer the term, caries, inasmuch as that of gangrene, may be applied to another condition of the teeth, namely,

necrosis, with as much propriety, as to the one now under consideration.

Commencing externally, caries usually attacks layer after layer of the tooth, and always leaves the outer strata softer and of a darker color than the inner. This difference of appearance is occasioned, no doubt, by a more thorough decomposition of the outer strata, and its greater exposure to the atmosphere.

The appellations, deep seated, superficial, external and internal, simple and complicated, have been applied by some writers to this disease. These distinctions are unnecessary, since they only designate the different stages of the same disease. By complicated decay, is meant a caries that has penetrated to the natural cavity of the tooth, and is accompanied by an inflammation of the lining membrane, that terminates in suppuration, and thus occasions the death of the tooth. The lining membrane, however, is not always inflamed by exposure, nor suppurated by inflammation.

The roots of the teeth frequently remain firm in their sockets for years after their crowns and necks have been destroyed by decay. The fangs themselves rarely decay; but nature, as if conscious that they were of no further use after the destruction of their crowns, exerts herself for their expulsion, by destroying their alveoli, and, in a short time, leaving them only to be retained in the mouth by their attachment to the gums. Three different actions, as Mr. Bell remarks, are gotten up for their removal; the first, is the absorption of their sockets; the second, a filling up of the alveoli with a deposite of bone; and the third, a gradual wasting away of the roots themselves.

DIFFERENCES IN THE LIABILITY OF DIFFERENT TEETH
TO DECAY—THEIR CAUSES.

Teeth that are well formed, well arranged, and of a firm texture, seldom decay at all, or if they do, very slowly: whereas, those that are imperfect in their formation, or improperly placed, decay from the most trivial causes. And, just in proportion as the osseous structure of the teeth is hard or soft, their shape perfect or imperfect, their arrangement regular or irregular, is their liability to caries diminished or increased.

The density, shape, and arrangement of the teeth, are influenced by the state in which the general system and the mouth are, during the time of their production. If, at these periods, all the functions of the body are healthily performed, these organs will be compact in their substance, perfect in their shape, and regular in their arrangement. But if, on the other hand, the body, or any part of it, and especially the mouth, be morbidly stimulated, the teeth will be more or less imperfect, and consequently less capable, than they otherwise would have been, of resisting the usual causes of decay, to which they may afterwards be exposed.

That the teeth should be thus influenced, will not appear wonderful, when we consider, that "there exists," as Richerand remarks, "amongst all the parts of the living body, intimate relations, all of which correspond to each other, and carry on a reciprocal inter-

course of sensations and affections.” Hence, if there is a morbid action in one part, other parts sympathise with it, and, as if sensible of the mutual dependence that there is between them, rally all their energies, to rescue their neighbor from the power of disease.

An increased action in one portion of the system, is generally followed by a diminished one, in some other part; thus, for instance, gastritis is usually produced by a constipation of the bowels; puerperal fever, by a diminished action in the heart, and an increased action in the uterus, &c. Whence, we may conclude, that if the body, at an early age, be morbidly stimulated, its functions will be languidly performed—the process of assimilation checked—the regular and healthy supply of bony matter, stopped—and that, consequently, the teeth which are then formed, will be defective. Other parts of the body, in which constant changes are going on, if thus affected at these early periods, may afterwards recover their healthy energies; but if once the teeth have been ill formed, they must ever after, because of their low degree of organization, continue to be so, and, consequently, much more liable to decay than those that are perfect.

“That the teeth acquire this disposition,” says Mr. Fox, “to decay, from some want of healthy action during their formation, seems to be proved by the common observation, that they become decayed in pairs; that is, those which are formed at the same time, being in a similar state of imperfection, have not the power to resist the causes of the disease, and therefore, nearly about the same period of time, exhibit signs of decay; while those which have been formed at another time,

when a more healthy action has existed, have remained perfectly sound to the end of life."

It is the opinion of most writers, that the power of the teeth to resist the various causes of decay, is sometimes weakened by a change brought about in their physical structure, through the agency of certain remote causes, such as the profuse administration of mercury, the existence of fevers, and all severe constitutional disorders.

Mr. Fox tells us, "That he has had occasion to observe, that great changes take place in the economy of the teeth in consequence of continued fever; and that the decay of the teeth is often the consequence of certain states of the constitution."

Mr. Bell remarks: "That amongst the remote causes, (of decay,) are those which produce a deleterious change in the constitution of the teeth, subsequent to their formation, one of the most extensive in its effects is the use of mercury. To the profuse administration of this remedy in tropical diseases, we may, I think, in a great measure, attribute the injury which a residence in hot climates so frequently inflicts on the teeth."

Severe constitutional disorders, and the administration of certain kinds of medicine, I think, do not, as Mr. Fox and Bell suppose, act directly upon the teeth, by altering their physical structure, and thus rendering them more liable to disease; but exert an indirect influence upon them, by vitiating the secretions of the mouth, and thus cause their decay.

The following considerations, to my mind, establish the truth of what has been here advanced. Artificial teeth of bone or ivory, which can undergo no such changes

as those mentioned by Mr. Bell, decay more rapidly after the profuse administration of any medicine, or during the existence of any disease, that tends to vitiate the secretions of the mouth. Furthermore, teeth that are of so dense a texture, that they are capable of resisting the action of the corrupt juices of the mouth,—though just as liable as those that are of a spongy nature, to any disease that can be communicated to them, from the general system, by means of their internal economy,—are not affected by any disease of the general system, nor by any action that has been produced in it by mercurial medicines.

My own observations give the following results: The gums and alveolar processes are sometimes destroyed by the use of mercury, while all the teeth loosen and drop out, without being at all decayed. The teeth of persons, in whom a mercurial diathesis has been for a long time kept up, or who have been for years suffering from dyspepsia, phthisis, fevers, or other severe constitutional disorders, often continue to be perfectly sound, while other teeth, in similar situations, frequently decay. Now all this goes to prove, not that changes are effected in the organization of the teeth, whereby their predisposition to decay is increased, but that there are differences in the capabilities of different teeth, to resist the acrid secretions of the mouth, to which such affections as have just been enumerated, always give rise.

The predisposition to decay, may, however, be increased by improper dental operations, as injudicious filing, careless plugging, &c.

I am aware that I differ with most of my professional

brethren on this point, as well as from received popular opinion. The views that I have here presented, are not the result of mere closet reflections partially matured, but of long and attentive observation. I have noted the effects of mercury, and of other sorts of medicines, as well as of constitutional diseases, of the severest and most protracted kinds; and I have always observed, that it was only as they impaired the healthy qualities of the juices of the mouth, that they affected the teeth. In fact, the density of the structure of these organs, their exposed situation, their functions, all would seem to indicate, that such changes in them, as take place in other parts of the body, are not only unnecessary, but even impossible.

Dr. Good remarks: "That caries of the teeth does not appear to be a disease of any particular age or temperament, or state of health."

It is not a disease of any particular state of health, farther than that certain disorders exert a deleterious influence upon the secretions of the mouth, and thus indirectly cause the decay of the teeth. That it is not a disease of any particular age, seems to contradict common experience, for it rarely happens, that caries appears after the age of forty. The reason of which is obvious. Teeth that are of a loose texture, or otherwise imperfect, are unable so long to resist the causes of decay, to which all teeth are more or less exposed, while those that are able to resist thus long, are generally enabled, by the increased density they gradually acquire, to resist them throughout life. Teeth, however, do sometimes, though rarely, commence to decay at fifty, or even at a later period of life. But caries

generally may be said to be confined to youth and middle age.

The formation, arrangement, and physical structure of the teeth, is sometimes influenced by hereditary diathesis of the general system, or of the parts concerned in their production. That a morbid condition of the system, either on the part of the father or mother, often predisposes their progeny to like affections, is a principle fully recognized by pathology, and a fact of which we have many fearful proofs.

Mr. Bell, in treating of what he calls the hereditary predisposition of the teeth to decay, remarks: "That it often happens that this tendency exists in either the whole or a great part of a family of children, where one of the parents had been similarly affected; and this is true to so great an extent, that I have commonly seen the same tooth, and even the same part of a tooth, affected in several individuals of the family, and at about the same age. In other instances where there are many children, amongst whom there existed a distinct division into two portions, some resembling the father, and some the mother, in features and constitution, I have observed the corresponding differences in the teeth, both as it regards their form and texture, and their tendency to decay.

Conclusive proofs, that there is an hereditary inclination in the teeth to decay, are almost daily presented to the dental practitioner. Yet I think that is occasioned, not by the transmission from the parent to the child, of any peculiarity of action in the teeth themselves, but of a similarity of action in the parts concerned in their production, so that the teeth of the child are, in form

and structure, like those of the parent whom it most resembles, and from whom it has inherited the diathesis. The teeth of the child, being thus shaped like those of the parent, possessed of a like degree of density, and, in most instances, similarly arranged, are equally liable to disease as they, when exposed to the action of the causes that produced it, are affected in a like manner, and generally at about the same period of life. Such being the fact, we may infer, that judicious and early attention may so influence the formation and arrangement of the teeth, that their liability to disease will be greatly diminished.

CAUSES OF CARIES.

Inflammation of the osseous structure of the teeth, is, at the present day, generally considered as the proximate cause of their decay. This hypothesis, for it can be regarded as nothing else, is predicated on the vascularity of the teeth, and is supposed, by its advocates, to constitute the basis of the present established treatment of caries.

That the teeth are endowed with blood vessels, nerves, &c. and are capable of being inflamed, is susceptible of the clearest demonstration; but, so far from the present established practice being in accordance with the supposition above named, it is directly opposed to it.

For were the hypothesis correct, the treatment that is now generally pursued, so far from preventing or stopping decay, would only tend to occasion or increase it.

Thus, for instance, the operations of filing and plugging, if well performed, usually arrest the progress of caries, and yet they always augment the sensibility of the teeth and their susceptibility to the actions of heat and cold, which are usually considered as exciting causes of inflammations.

Long continued inflammation of the membranes of a tooth, may end in its entire death, but I cannot believe that inflammation of the osseous structure of a tooth alone causes a decomposition of any portion of its substance. For were such a change produced by any vital action in the teeth themselves, the parts thus deprived of vitality, would be exfoliated and their loss repaired by a new formation of bone, which never occurs; and hence, we are led to conclude that the vital powers of the teeth are too weak for the decomposition, exfoliation, or restoration of any portion of their substance. Were their living powers more active, it is probable that their diseases would be more analogous to those of the other bones.

The bony structure of the teeth is often inflamed without there being any decay, and it often decays without being at all inflamed. Artificial human teeth waste away more rapidly than natural living ones of the same density. These are facts of daily observation, and conclusively show, that however much inflammation may influence the character of caries, it is not necessary to its existence.

If these views are correct, we are forced to believe that caries of the teeth is caused by external agents—by the action of some corroding menstrua upon their external bony surfaces—and that it never, as

is supposed by Messrs. Fox, Koecker, Bell, and some others, commences within the osseous structure of the tooth. Of this I was fully convinced, long before I had satisfied myself as to the manner in which the disease was produced, for I had observed, that it always commenced externally, on those parts of the crowns of the teeth, that were the least perfectly protected by enamel; as, for instance, the depressions on the grinding surfaces of the molares, and the sides of the teeth that come in contact, where, from the pressure of the organs against each other, their crystalline coverings frequently become fractured.

A thorough investigation of the subject, will, I am convinced, satisfy any one, that caries always commences externally, and generally upon the osseous structure of the tooth,—the enamel being so hard, that it is seldom affected by the causes that produce the disease.

Dr. Fitch, while commenting on the views of Hunter, Fox, Koecker, and others, remarks, "That if the observations of these two latter gentlemen, (alluding to the doctrine of internal decay,) are true, I must acknowledge, that the sphere of usefulness, on the part of the surgeon dentist, is, to say the least, extremely limited. For if their observations are true, this disease, in its commencement, in one half of the cases, is entirely out of the reach of medical aid." Dr. F. admits, however, as do most writers, that it does sometimes commence within the body of the tooth.

The disease frequently first shows itself in a small speck, which, as it progresses towards the centre of the tooth, increases in circumference, until perhaps a half or fourth of the crown is destroyed by it. This has, no doubt, given rise to the doctrine of internal decay.

Those parts of the teeth that are covered with a thick smooth enamel, are, in the first instances, never attacked by caries, unless the enamel has previously sustained some injury; and it is not necessary that the injury should be very conspicuous, in order to admit of a contact between agents that produce this disease and the subjacent bone; they may be of so subtile a nature as to be able to penetrate even a very small fracture. The enamel sometimes, though rarely, decays.

The following, if the views here taken be correct, is the true description of the causes and progress of caries. The decay of the teeth, is occasioned by the direct action of some solvent on the external osseous surface, which penetrates and destroys the first layer, with which it comes in contact, and then acts upon each successive stratum in a similar manner, until the whole body of the tooth is destroyed. It is necessary for the production of caries, not only that this solvent should touch the exterior osseous surface of the teeth, but also that it should be retained there for some time; which may be proved by the fact, that when teeth are filed, to prevent their approximation, so much, that their enamels are entirely cut away, they are rarely affected with caries, though they are at the same time far more susceptible to the action of heat and cold, which are considered by most writers as two powerful exciting causes of decay.

This theory explains the *rationale* of the present system of treatment, and the differences in the liability of different teeth to decay. By the removal of the decomposed part, and the filling up of the cavity with some

indestructible material, the presence of those agents, upon which caries depend, is removed, and its progress arrested.

A great variety of opinions have been advanced in relation to the causes that produce this disease; many of which are not only absurd, but destitute of a single fact for the support of their claims to credibility.

The next thing that claims our attention, is the particular kind of agents concerned in the production of caries. We shall, however, first notice some of the opinions that have been advanced concerning the point about to be considered.

Particular sorts of diet, such as for instance, animal food, are said to exercise an unhealthy influence upon the teeth. In proof of the assertion, we are informed, that Indian nations, who live principally upon vegetables, scarcely ever have a tooth to decay. But the same may also generally be said of those nations who subsist chiefly on animal diet, and who enjoy an equal degree of constitutional health. Savage and barbarous people are usually possessed of better teeth than those of civilized nations; because their systems are not enervated by luxurious living. So far as diet is capable of affecting the health of the body, it may be considered as an indirect cause of caries, for the health of the child is dependent on the health of the parent, and, to the absence of disease in the general system during childhood, the period when the second denture is being formed, is attributable the soundness of the teeth of savage nations.

Animal food may, under some circumstances, be more injurious to the health of the teeth than vege-

table but not to the extent to which many have supposed. The fibres of animal matter are rather more apt to be retained between the teeth, than particles of vegetable substances; and by remaining there until they undergo a chemical decomposition, they may vitiate the secretions of the mouth, and thus cause the teeth's decay.

M. Ribe endeavors to prove that hot food is a cause of caries; because "man is the only animal accustomed to hot food, and almost the only animal affected with carious teeth." Had he instituted a comparison between the teeth of man and of brutes, and between the solvent agents to which they are respectively exposed, he might have traced the decay of the human teeth to its proper cause.

"The Indians of North America," remarks M. Til-laëus, "knew nothing of the inconvenience of carious teeth and debilitated stomachs, until after the introduction of tea amongst them." From this, one might suppose that tea caused the teeth to decay, and that dyspepsia was mainly attributable to its use.

The decay of the teeth of these people, since the introduction of tea amongst them, may, however, be much more plausibly accounted for. The susceptibility of these organs to the action of such causes as produce the disease, have, by the impaired state of their general constitutional health, occasioned, since this time, by the use of spirituous liquors, and the luxuries common to civilized life, in which they have indulged, been greatly increased.

That caries is produced by external corrosive agents, as is asserted by Messrs. L. S. and E. Parmly, is too

obvious to admit of doubt. This opinion,* although opposed to the more popular theory, that it is the result of inflammation of the bony structure of the teeth themselves, is also entertained by many other eminent practitioners, and even those who reject the doctrine of the production of caries, by the direct action of external agents, enumerate among its *exciting causes*, every thing that tends to vitiate the secretions of the mouth; and, to a vitiated state of these juices, the decay of the teeth is, I am fully persuaded, principally attributable, and whatever tends to deteriorate their healthy qualities, may be regarded as contributing to the disease.

Among the indirect causes, therefore, of caries, the following may be enumerated: putrescent particles of vegetable or animal matter between the teeth, depositions of tartar, a febrile or irritable state of the body, a mercurial diathesis of the general system, artificial teeth improperly inserted, or of bad materials; roots of old teeth, irregularity in the arrangement of the teeth, too great a pressure of the teeth against each other, and, in short, every thing that is productive of irritation to the alveolar membranes, the periosteums of the fangs of the teeth, or the gums.

When to these considerations, we add, that the juices of the mouth are very analagous to those of the stomach, and that these are capable of dissolving the hardest

*By a chemical agency on those relics of the food, which accidentally lodge between them, (the teeth,) a deleterious change takes place, constituting an active poison, which corrodes their structure. *Lectures on the Teeth by Mr. L. S. Parmly, p. 31-2.*

From my own observations, I am induced to believe, that caries is universally caused by the action of external agents. *Essay on the Disorders and Treatment of the Teeth, by Mr. E. Parmly, p. 32.*

bone, no one, I think, can doubt, that they are fully sufficient to produce caries.

The doctrine that I have here advocated, is one, I confess, that I, for a long time, was unwilling to believe, because it was opposed to all my earlier preconceived notions of the subject; but long and attentive observation, has forced me to acknowledge its truth; and I have here endeavored to state, as forcibly as I am able, the manner in which I arrived at this conviction.

PREVENTION OF CARIES.

It is an old adage, no less true than trite, that "An ounce of prevention is better than a pound of cure," and in the present instance it may be applied with its full force. Were more attention paid to the practical instruction thus conveyed, many of the most distressing diseases of the teeth, might be avoided.

Most of the remarks that might have been made on this subject, have been anticipated; consequently it will only be necessary to observe, that if the teeth are well formed, and well arranged; all that they will require, will be, to keep them clean; and if any irregularity occurs, it should be remedied by the means before described.

A tooth-pick is better adapted than any other instrument, to remove the small particles of food, that stick between the interstices of the teeth. The best material of which it can be formed, is a common goose-quill.

The enamel should be kept free from all stains, and if it cannot be done by the use of the brush alone, a dentifrice should be used three or four times a week, until the object be attained. For this purpose a composition of the following articles may be used with advantage:

R Orris root, 3 ij.
 Prep. chalk, 3 ij.
 Prep. pumice stone, 3 i.

reduced to an impalpable powder, and passed through a sieve of very fine cloth. It should be applied by means of a fine sponge, slightly moistened.

The importance of keeping the teeth clean, cannot be too strongly impressed upon the mind of every individual. Proper attention to the cleanliness of these organs, contributes more to their health and preservation than is generally supposed. Against caries it is a most powerful prophylactic. "Where the teeth," says Mr. L. S. Parmly, "are kept literally clean, no disease will ever be perceptible. Their structure will equally stand the summer's heat, and winter's cold, the changes of climate, the variation of diet, and even the diseases to which the other parts of the body may be subject from constitutional causes."

CHAPTER VIII.

TREATMENT OF CARIES—FILING—PLUGGING, &c.

FOR arresting the progress of caries, two modes of treatment are recommended—filing and plugging. The former of these operations is for superficial, and the latter for deep-seated, decay. The manner of performing each, will be described under its appropriate head.

FILING.

There is no operation of the dental art, against which a stronger or more universal prejudice prevails, than that of filing the teeth; but when it is judiciously advised and skillfully performed, there is none which is more beneficial to them, or effectual in arresting the progress of their decay. Vast numbers of teeth, by its means, have been rescued from the ravages of caries, and, in numberless instances, have been preserved throughout life. But, though it has been productive

of much good, it has also, in some cases, been productive of much evil.

In canvassing its merits and demerits, I cannot do better than present my readers with the views of my brother, Dr. John Harris, given in a paper, published in March, 1835.

“Filing is an operation, when skillfully performed, of great importance, in the treatment of decayed teeth; but, when performed without the proper skill and judgment, as is too often the case, it cannot be too strongly censured.

“Notwithstanding the prejudices of society, and the conflicting opinions of dental authors in relation to this operation, I shall attempt to show, that its merits have been too much estimated by its abuses, and that the discriminate use of the file does not necessarily cause the teeth to decay.

“The histories of the Bramins of India, and the negroes of Abyssinia, furnish sufficient proofs to establish my last proposition. The Abyssinians are a ferocious and warlike people, and, to make themselves appear more savage, they file their teeth to points, so as to make them resemble the teeth of a saw, or those of carnivorous animals. It cannot be supposed, from the character of these people, that either much skill or judgment is exercised in the performance of the operation, though it, no doubt, requires a considerable time to remove so large a portion of the enamel and bony substance of the teeth, without producing pain. The operation, with them, is of ancient origin, and, notwithstanding the extent to which it is carried, we are credibly informed, that their teeth are remarkably sound, healthy, and very rarely decay.

“The Bramins of India, also, have long been in the habit of using the file, principally, I believe, for the separation of their teeth, but whether for the purpose of removing decay, or of beautifying them, I have never been able to learn; but, from the circumstance of their having good teeth, it is, most likely, used for the latter purpose.

“I have mentioned these two people on account of the contrast between their habits of life, which better elucidates the fact that I have attempted to establish. If filing the teeth necessarily causes them to decay, why has it not produced this effect in the cases just mentioned? Had I only referred to the practice among the Bramins, the answer might have been, that they are more skillful than the American dentists in the use of the file. But this answer cannot be applied to the Abyssinians, for it is well known that they are ignorant and brutish, and totally unacquainted with the arts and sciences.

“Climate, habits of life, and modes of living, have a controlling influence in the formation of different temperaments, and in the generation and character of the teeth. To form a correct estimate, therefore, of the use of the file, we should be acquainted with the health of the person, both before and after the operation,—the physical condition and peculiarities of the teeth, and the competency of the operator.

“When the general health of the patient is good, the teeth regular in their arrangement, and perfect in their physical structure, the skillful use of the file does not cause them to decay; and when, in such cases, they do decay, it must be the effect of some other cause, for if

it were not, the negroes of Abyssinia, who use the file to a much greater extent than almost any other people, would have very bad teeth."

Were other proofs wanting to establish the fact that filing does not, of necessity, cause the decay of the teeth, we could refer to the women of Sumatra, who make a free use of the file with impunity; and to the Malay tribes, who are in the habit of cutting deep horizontal grooves across the anterior surfaces of the upper front teeth, and who generally possess these organs in a sound and healthy state. The daily observation of every practitioner, also, is of itself sufficient to confirm our position. He sees persons, whose teeth have been filed ten, twenty, thirty, and perhaps even forty years, without their ever having decayed, after the operation was performed.

Teeth frequently decay after filing, and sometimes even faster than they otherwise would have done, but it does not follow from this, that caries is a necessary consequence of this operation; it only shows that the file has been improperly used, and that, consequently, the teeth have been thrown into a condition more favorable for the action of such agents, as are principally concerned in the production of decay.

When the teeth are filed, the file should be used sufficiently to remove every particle of caries and prevent the close approximation of the teeth, otherwise, the secretions of the mouth, from the easy lodgment afforded to extraneous matter, will become more vitiated than they were before, and be equally as readily retained in contact with the bony structure of the teeth.

In order to ensure the success of the operation, it will sometimes be necessary to cut away considerable portions of the teeth, and in doing this we must be very careful not to destroy their symmetry. The aperture, between their exterior surfaces, should be just wide enough to allow a safe-sided file a sufficient diagonal motion to remove the decay. One-third or more of a tooth may thus be cut away without materially altering its external appearance. To prevent the teeth's coming together, the file should never be passed entirely through to the gums.

When the decay covers a large portion of the lateral surfaces of the teeth, and has penetrated to a considerable depth, the anterior portions of the enamel will often present uneven, ragged edges; and it is then necessary to form a wider exterior aperture.

To separate the bicuspidæ, an aperture should be made somewhat in the form of the letter V; its sides, however, should not be so widely separated at the grinding surfaces, nor should they form an angle at the gum. For this purpose, a file, shaped like the pinion file of a clock, should be used.

An opening of this kind effectually prevents the teeth from coming together, and, if plugging is requisite, it enables the operator to do it in the most perfect manner.

The same sort of aperture should be made when it is required to separate the molars. These teeth are situated so far back in the mouth, that it will be necessary to use what is usually denominated a file carrier, an instrument so well known, that no description of it is needed.

After the teeth have been thus separated, the filed surfaces should be made as smooth as possible, by means of a very fine file and burnisher, and the patient directed to keep them perfectly clean, in order to prevent the adhesion of mucous and other extraneous matter, which, if long continued, would inevitably occasion the destruction of the teeth.

The sensation produced by filing is, to most persons, disagreeable, and, to some, positively painful; but, when once the operation has been commenced, it should never be left uncompleted. If the patient becomes alarmed, his fears should be quieted by a true statement of the case, and his consent to proceed, won by a mild and persuasive deportment.

Some may think that I have attached more importance to this operation than it merits; but, having seen the good and evil effects that result from it, I have endeavored to guard the unexperienced against the one, and direct him how to attain the other.

PLUGGING.

This operation is of ancient origin, and was first performed in the first century. Its utility has, therefore, been fully tested by experience. There can be no doubt that it is the most effective means, for the restoration and future preservation of decayed teeth, that can be used. The part of a tooth that has been well plugged, and with a suitable material, may generally be regarded as exempted from all future attacks of decay.

This fact is easily accounted for, by the theory of caries; that we have advocated; but were it true, as is generally supposed, that caries is the effect of inflammation, then the decay would still go on after this operation had been performed; for inflammation often continues a long time after a tooth has been plugged.

The success of this remedy depends altogether upon the material used for stopping the cavity, and the manner in which it is inserted. It should be incorruptible, else it will be destroyed by the secretions of the mouth, and, instead of preserving the teeth, it will only hasten their destruction.

Tin, silver, and lead, are often used for plugging. The first two of these substances are very liable to be oxydized, and will not, consequently, long remain in the tooth. The salts of the other are soluble in the secretions of the mouth, and, therefore, it is even less suitable, because their introduction into the stomach may produce deleterious effects on the general system.

Amalgams and alloys, fusible at a low heat, have also been recommended to be poured, while in a state of fusion, into the cavity of the tooth. There are the same objections to the use of these, as there are to the use of tin, silver, and lead; besides, the great and sudden change produced in the temperature of the teeth, by the application of such hot bodies, often causes an inflammation of the lining membrane.

One of the alloys, here alluded to, is composed of bismuth, tin, and lead, and is fusible at boiling heat. It is now, however, but little used.

One of the amalgams, that has been and is still extensively used, is composed principally of mercury

and silver, and is known by the name of *Royal Mineral Succedanium*. When first put into the tooth, it is soft, but it gradually hardens, as the mercury evaporates; and, if used in large quantities, is very apt to produce ptyalism.

Out of the many cases of the evil effects that have been produced by the use of this article, I shall mention only one:

In the summer of 1834, Mr. T——, a highly respectable gentleman of this city, called on me and requested me to plug several of his teeth. One of them was so much decayed, that I advised him to have it removed; but, intending to start on the morrow to the North, he concluded to defer its extraction until his return. On his arrival at New York, he saw the advertisement of an association of dentists, who pretended to extraordinary skill in the treatment of carious teeth. Anxious to preserve, if possible, his tooth, he submitted to their operations. The cavity was filled by them with the above amalgam, set forth under the imposing appellation of the *Royal Mineral Succedanium*. The result was what might have been anticipated. The evaporation of the mercury so lessened the size of the plug, that in a few days it became loosened and dropped out.

Gold is the only metal that should be used for plugging; and, whenever the cavity in a tooth is well filled with this material, its future preservation may be confidently relied on. The gold, intended for this purpose, should be perfectly pure, well annealed, and beat very thin. Six grain leaves, I have found, are more suitable for plugging than any others. They may easily be pressed into all the inequalities of a cavity, and condensed in the most perfect manner.

The duration of a plug in a tooth, however pure and well prepared the gold may be, depends upon the manner in which it is inserted. Before its introduction, a suitable cavity should be made for its reception, by removing every particle of carious matter, and sometimes, in addition, a small portion of the sound part of the tooth. The bottom of the cavity should always be a little larger than the top, or at least as large. The difference between them, however, should never be very great; for if the interior of the cavity is much larger than the exterior, it will be difficult to condense the plug enough to render it impermeable to the saliva, and, *vice versa*, the plug will become loosened, and drop out.

To form this cavity, a variety of small instruments, with curved, and other shaped, points, are necessary. They should be of different sizes, and so formed, that they may be applied to every part of a tooth.

These instruments are called excavators, or cutters, and are either separately fixed in small handles, or are all fitted to one common handle, by means of a socket. Those fixed in separate handles are the most expensive, but are somewhat preferable to the others, chiefly because they can be used with more convenience.

The flat, and round, or cherry-headed drills, are also very serviceable in this operation. They are sometimes used in a socket handle by the hand, and at other times, in a stock, by means of a bow and string. Many persons object to the latter mode of using them, because they suppose it is productive of more irritation to the bony structure of the tooth than the former. My own experience induces me to dissent from their opinion. I have used the drill and bow for the last ten years, and

have never known any evil consequences to result; consequently I feel fully authorised to recommend the use of them to others. To say the least, the sufferings of the patient are greatly abridged, since the decay can, in this manner, be removed in about one-sixth of the time in which it could otherwise have been.

The drill and bow were used by the late Dr. Hudson, for many years before his death; and neither this, nor any other country, has produced a more skillful practitioner.

The point of the instrument should frequently be dipt into cold water, in order to prevent its becoming heated, it being important that the cavity should be kept cool.

Every part of the decay cannot always be reached by the drill: in such cases, the excavator should afterwards be used.

When the decay is on the sides of the teeth that come in contact with each other, they should be separated by a file, sufficiently to allow the operator to operate with ease, otherwise, it will be impossible to remove the caries, and plug them in a proper manner.

After the decay has been removed, the cavity should be properly cleansed and dried, before the plug is inserted. This may be effected, by employing a properly constructed syringe, or a piece of cotton moistened in tepid water, and fastened to the end of a small probe, or to the point of an excavator. The cavity should afterwards be wiped with a dry piece of fine linen, or raw cotton. Many practitioners have neglected thus to dry the cavities, and to this neglect, their want of success may be mainly attributed; for however well a tooth may be

plugged, its future decay cannot be prevented, unless this practice of cleansing and drying has met with proper attention.

A considerable number of instruments, called pluggers, are necessary for inserting the gold; some with straight, others with curved, or blunt points, according to the place and manner in which they are to be used. They should be made of the best German steel, or else they will be very liable to be broken by the great pressure that they will be required to sustain. Any further description of these instruments is unnecessary, for every dentist has them made to suit his own peculiar fancy.

After the cavity has been cleansed and dried, and the proper instruments for inserting the plug provided, a strip of gold, of the description before noticed, loosely rolled or folded together lengthways, and large enough to fill the opening, must be pressed in, according to the following manner:

One end of the strip, or roll, should first be introduced on an instrument suited to the situation of the cavity, and of a size somewhat less than its circumference; and then the other parts should be gradually pressed in. There should be very little pressure at first, but as the operation progresses, it should be increased, and exerted on every part of the cavity alike.

If a sufficient quantity of gold has been used, the surface of the plug will assume a conical form, and this cone must be firmly pressed upon by means of an instrument with a larger point than the one first employed; a smaller pointed instrument should then be used, to press its edges against the sides of the cavity. In this

manner, not only is the gold itself rendered impermeable to all fluids that may come in contact with it, but also not a single interstice is left between the gold and the sides of the opening. After this, the projecting part of the plug should be removed, and the surface of the remaining portion properly burnished.

It should be distinctly recollected, that the operation which has been just recommended and described, is only admissible in certain cases, and that when it is performed without a due regard to circumstances, it is sometimes productive of very serious and alarming consequences.

When the decay has extended to the dental cavity, a plug should never be inserted, unless it can be placed in such a way as not to touch the lining membrane: And even when this has been destroyed, it is very questionable whether the operation should be performed on any other teeth than the front ones; for after the membrane has been destroyed, there is usually a morbid secretion in the canal passing through the root of the tooth, which generally discharges itself externally through the decayed opening, and when this is closed, it accumulates within, and finally occasions an alveolar abscess or a diseased antrum. The former result is of more frequent occurrence than the latter.

I have frequently plugged teeth under such circumstances as have been here described; but from the operation being frequently followed by alveolar abscess, I, long since, became convinced that, in the majority of cases, the practice is bad, and therefore determined never to follow it, unless I could be positively certain

that there was no diseased action in the roots of the tooth.

Even though the vitality be entirely destroyed, yet there is still a discharge of pus through the fangs, which, if the opening in the crown be closed, must of necessity accumulate, and in a majority of instances, produce one or other of the effects just described. No attempt, therefore, should ever be made to destroy the nerves and vessels of the tooth for the purpose of plugging. I make this remark in order to guard the unexperienced practitioner against a practice, that has obtained to a considerable extent, and which, I am sorry to say, is recommended by some very respectable writers. I allude to the custom of destroying the nerve, either by drilling it out, or by actual cautery. In a front tooth this may be done, but in a bicuspid or molar, it can rarely be effected, and even if it could, no advantage whatever would result from it, for the tooth would thereby be rendered useless.

A tooth may sometimes be plugged, when the nerve is exposed; but great care should be taken to prevent the gold from coming in contact with it, or else great pain will be produced, and the removal of the plug rendered indispensable.

Mr. Koecker recommends, in cases of this kind, to cover the exposed nerve with a thin piece of leaf lead, because he thinks lead is less irritating to the animal fibre than any other metal. I have never tested the merit of his recommendation; but I think it to be injudicious, because of the extreme sensibility of the dental pulp.

Dr. Fitch says he has been in the habit of covering

the exposed nerve with a gold plate, and that it has often answered the purpose intended. I think this plan far preferable to that of Mr. Koecker's, especially if the plate be so adjusted, that it rests upon the circumjacent bone.

If the membrane be inflamed, the inflammation should be reduced before the gold is introduced. To attain this end, Dr. F. recommends the use of Aleppo galls, and directs a small portion of the soft part of a fresh nut to be placed in the cavity of the tooth, and the cavity to be covered with beeswax, in order to protect it from the action of the air; the whole to be renewed every ten or fifteen days. He speaks of this mode of treating an exposed nerve, in the highest terms of commendation; but, for my own part, having tried it in some fifteen or twenty cases, I am not much disposed to join him in its praises. I have succeeded in several cases, with a mixture of æther, camphor, and alum, after the Aleppo galls had failed. The ingredients were prepared and applied in the following manner: to one ounce of æther was added one ounce of pul. camph. and two drachms of pul. alum; a lock of cotton was then saturated with this solution, placed inside of the tooth, and every day renewed, until the inflammation was reduced.

This remedy is not recommended as infallible; and while I declare that it has been more successful than any other, that I have ever tried, candor compels me to add, that it has failed in more instances than it has succeeded. Indeed I regard the propriety of plugging a bicuspid or molar, after the nerve has been exposed, as so extremely doubtful, that I think that I hazard

nothing in asserting, that, however correct the preparatory treatment may have been, it will not be successful in more than in about one case out of four.

Teeth are sometimes exceedingly sensitive, without there being any exposure of the nerve. This need never deter the operator from plugging them, since it very rarely happens, that any inconvenience is experienced after this operation has been performed.

Teeth that decay on their sides, are much more apt to be sensitive, than those that decay on their grinding surfaces.

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CHAPTER IX.

ODONTALGIA—ITS TREATMENT.

FEW persons reach maturity without being attacked with tooth-ache, either in one of its milder or more aggravated forms. This pain is generally so excruciating, that none but those who have experienced it, can form an adequate idea of its torture: and yet many are content to suffer the agony it inflicts, rather than have the offending tooth removed.

Its attacks are very variable in their form and duration. Sometimes it commences with a slight pain, which gradually increases in severity, until it becomes almost insupportable. At other times, the first monition of its presence, is a sharp pain, that shoots, with the rapidity of lightning, from the tooth in which it originates, through other parts of the body. In some cases, it is a deep-seated, throbbing sensation; while in others, it is only a slight tantalizing pain. Sometimes it continues for a long while, without any intermission. At other times, it recurs at uncertain inter-

vals, and continues, from fifteen or twenty minutes, to one or two hours, at a time.

It is generally, but not always, confined to the tooth in which it originated, for sometimes it passes from one to another, until the whole row is affected: and it not unfrequently happens, that the cause is seated in one tooth, while the pain is felt in another, even situated, it may be, on the opposite side of the mouth.

This most distressing affection is the result of inflammation, either in the lining, investing, or alveolar membrane, or it is occasioned by a transfer of nervous irritation.

The lining membrane is much more apt to inflame, than either the investing or alveolar; because it is much more liable, from the decay of the teeth, to be exposed to the action of acrid humors, and to exciting and irritating agents of various other kinds. Moreover, when it does become inflamed, the inflammation occasions a much greater amount of pain, because surrounded, as it is, by an unyielding bony paries, there cannot be any considerable distention of its vessels, consequently the pressure upon its ramifying nerves, must necessarily be very great, and the pain arising from it, of the severest kind.

If the alveolar membranes, or the periosteum of the roots become inflamed, they never occasion as much inconvenience as the pulp, when in the same situation: the inflammation, however, is very apt to extend from them to it; but when this happens, it is generally of a less active character, than that arising from other causes, and hence the consequences are generally of not so serious a nature.

When these membranes are inflamed, they become thickened, and cause the tooth slightly to project from its socket, so that it strikes, at each occlusion of the jaw, the tooth which it antagonizes, before the other teeth meet. The inconvenience occasioned by this projection, is sometimes so great, that the proper comminution of food is prevented, and when prompt measures are not taken for the reduction of the inflammation, it causes it to assume a chronic form, and thus finally occasions an absorption of the socket, and the consequent loss of the tooth.

Inflammation of the lining membrane is generally occasioned by the direct contact of acrid humors, and of irritating and exciting agents, such as decayed portions of decayed teeth, small particles of food, and vitiated secretions of the mouth, &c. It can never, however, be thus produced, except when the pulp, from the decay of the tooth, or some other cause, becomes exposed. It is, however, sometimes brought on by hot and cold beverages, cold currents of air passing through the mouth, mechanical violence, improperly performed dental operations, and from inflammation of the membranes of the roots.

The inflammation of the membranes last mentioned, is generally the result of tumefaction of the gums, which is occasioned by depositions of tartar, profuse administration of mercurial medicines, colds, cachexy, blows, and jarring of the teeth, produced by an unskillful use of the file.

But we often meet with cases of tooth-ache, that are the result of none of the causes that have been just enumerated. These are induced by a morbid symp-

thy between the teeth and some other part of the body. Persons of a nervous temperament, and pregnant females, are particularly subject to this sort of tooth-ache; and sometimes it is a symptom of a disordered state of the stomach. Its attacks are usually periodical, seldom lasting more than two or three hours at a time, and recurring sometimes at stated, but more generally, at uncertain intervals. Sound teeth are almost as much subject to it, as those that are decayed. It is often difficult to distinguish which of the teeth is most affected by it; for it often seems, at one minute, to be seated in one tooth, and at the next, in another; and thus passes round the whole jaw. In some instances, it is acute and lancinating; in others, dull and heavy.

Some teeth, from some unknown idiosyncrasy, are much more liable to ache, than others. Whole sets sometimes decay, and crumble to pieces, without pain, while others, apparently perfectly sound, are very painful.

In treating of odontalgia, Dr. Good observes: "This is often an ideopathic affection, dependent upon a peculiar irritability, from a cause we cannot easily trace, of the nerves subservient to the aching tooth, or the tunics, by which it is covered, or the periosteum, or the fine membrane that lines the interior of the alveoli. But it is more frequently a disease of sympathy, produced by pregnancy, or chronic rheumatism, or acrimony in the stomach, in persons of an irritable habit."

"It is still less to be wondered at, that the nerves of the teeth should often associate in the maddening pain of *neuralgia faciei*, or *tic douloureux*, as the French wri-

ters have quaintly denominated it, for here the connection is both direct and immediate. In consequence of this, the patient, in most instances, regards the teeth themselves as the salient points of pain, (*and they unquestionably may be so in some cases,*) and rests his only hope of relief upon extraction; and when he has applied to the operator, he is at a loss to fix upon any one point in particular. Mr. Fox gives a striking example of this, in a person from whom he extracted a stump, which afforded little or no relief; in consequence of which his patient applied to him only two days afterwards and requested the removal of several adjoining teeth, which were perfectly sound. This he objected to, and suspecting the real nature of the disease, he immediately took him to Mr. (now Sir) Astley Cooper, who, by dividing the affected nerve, produced a radical cure in a few days."

The author of this work is acquainted with a gentleman similarly affected, as the one mentioned by Mr. F. He has had all his teeth on the right side of both jaws, extracted, without obtaining relief.

ITS TREATMENT.

Ever since the days of Hippocrates, it has been considered as an axiom in medicine, that the first step to be taken in the treatment of disease, is the removal of all the primary causes; and to no disorder will this maxim be found more applicable, than to the one now under consideration. The treatment of it, therefore,

should vary according to the causes that have produced it; and, if the lining membrane of the aching tooth is not exposed, we may, generally, expect to meet with full success.

But when this membrane has become exposed, although we may, by the application of leeches to the gums, and of soothing and astringent preparations to the cavity of the tooth, sometimes be able to reduce the inflammation, and thus afford temporary relief; yet the nerve, from its unprotected condition, will ever afterwards be liable to injury and renewed attacks of inflammation. Hence, in such cases, the tooth, if not situated in the anterior part of the mouth, should be extracted. This operation, however, we are not always allowed to perform, and, consequently, a resort to other means often becomes necessary.

In such cases two or three leeches should be applied to the gum of the affected tooth, and the same treatment, as that recommended on page 162, be adopted. I have also found the following preparation very serviceable:

R Sul. æther, ʒ i.
 Kreosote, ʒ ss.
 Ext. nut galls, ʒ i.
 G. camph. ʒ ss. *Misce.*

A sufficient quantity of this mixture may be introduced into the tooth by means of a bit of lint or raw cotton. This should be renewed once a day until relief be obtained. This is certainly the best preparation for affording temporary relief, that I have ever used, and so immediate is its result, that it almost seems to act like a charm. I do

not, however, recommend it as a certain remedy; for the pain is liable to recur after it has been applied and removed, and, in many instances, it has altogether failed.

Some writers advise the destruction of the nerve* of the tooth, when it becomes exposed. To effect this purpose, many plans have been proposed, but, on account of the numerous failures that have attended them, the practice has now fallen into much disrepute. The principal means recommended is, the use of the *drill*, application of actual cautery, nitrate of silver, arsenic, and nitric, sulphuric, or muriatic acid.

The use of cautery may often be successful, but, inasmuch as it almost always produces inflammation in the investing and alveolar membranes, I cannot unreservedly recommend it. The application of nitrate of silver generally fails, and much increases the pain and inflammation. The same may be said of the application of nitric, sulphuric, and muriatic acids. The employment of arsenic is highly recommended by Dr. Spooner, of New York, the author of a late popular treatise on the teeth. Of its efficacy, I can say but

* "The success of attempts at destroying the nerves of the teeth, is far more limited than is generally imagined; and I wish it particularly to be borne in mind, that I approve of the practice only in a limited way. In a front tooth, the nerve is most commonly destroyed by a single operation, because the fang is single, and has the advantage of being more perpendicular than in a tooth with divaricated fangs. But it is an erroneous idea, that a diseased tooth, if it has more than a single fang, may be rendered useful and free from pain by destroying its nerves. The practice has only served to expose the emptiness of the theory, since most of those who have undergone the operation, which can be termed little less than martyrdom, have barely found that they have been made to forget the usual pain of tooth-ache, in the unutterable agony of the operation."—*An Essay on the Disorders and Treatment of the Teeth*, by Eleazar Parmly, New York, p. p. 51, 52.

little from experience, but, from the caustic properties of arsenic, I am induced to believe that, when the inflammation is not very violent, it will be successful. The fact, however, that this article is a most deadly poison, and that, in those cases in which it is really important that the nerve should be destroyed, it may be done by less dangerous and more effectual means, will preclude its use from ever becoming very general. For the destruction of the nerve, in teeth that have but one fang, I would recommend the employing of the drill, as far superior to any thing that has been heretofore proposed.

It seldom happens, that a molar tooth can be preserved after its cavity has become exposed; the only advantage, therefore, that can result from the destruction of its nerve, is a temporary relief from present suffering. But, since the means that have been recommended to effect this purpose, to say the least, often fail of their object, I question the propriety of their employment upon this class of teeth, under any conceivable circumstances.

The objections that have been urged against allowing a tooth to remain in the mouth after it has lost its vitality, are much more applicable to the molares, than to the incisors, cuspidati, or even the bicuspidates. The morbid influence exerted by a dead tooth, is generally in proportion to the number of its fangs, and the want of attention to its cleanliness; consequently, as the front teeth have each but one root, and are more readily kept clean, they will not, if deprived of their vitality, become so hurtful to their dependent parts, or to the economy in general, as those teeth that lie farther back

in the mouth. Moreover, their nerves may be almost instantaneously destroyed by means of a small drill, without much danger of subsequent inflammation in their external membranes.

Tooth-ache, occasioned by inflammation in the lining membrane of a tooth, in other respects sound, is often of the severest and most protracted kind, especially when it is followed by suppuration, for then a constant irritation is kept up in the adjacent parts. In cases of this kind, it is advisable to open a communication with the cavity, through which the pus may be discharged. This opening should not be closed, else the matter will re-accumulate, and the relief be but temporary.

In the treatment of inflammation of the periosteum, of the roots and of the alveolar membranes, all irritants should be at once removed; after which, leeches should be applied to the gums, and fomentations to the face. The mouth should also be washed with an astringent and detergent lotion, three or four times a day. Cataplasms of the seeds of the *Hyoscyamus*, and also of the mustard plant, are recommended as proper applications for the face; they will often afford considerable relief, but I think hot salt, moistened with vinegar and laudanum, to be far preferable to any external application that I have ever tried.

When the pain is produced (as often happens) by a disordered state of the stomach, a cathartic generally affords relief. But if it be dependent on long continued nervous irritation of the general system, tonics, gentle exercise, change of air, and such other constitutional remedies, as the peculiarity of the case may indicate, will be prescribed by the regular physician.

Local applications, in cases of this sort, are of but little service. They may, however, sometimes be used as auxiliaries to other means.

There are two operations, that have been recommended for the cure of odontalgia, which here specially demand our attention. One of them, is the excision of the crown of the aching tooth, and the other, its partial extraction and immediate replacement in its socket.

The former of these operations, a few years ago, obtained considerable popularity with the surgeons and dentists of Europe, from its having been recommended by Mr. Fay, in a communication of his, made to the London Society of Arts.* It was supposed that the crown of the tooth might, by this operation, be cut off low enough to allow the entire removal of the pulp, and thus not only give immediate relief from pain, but also prevent its future recurrence. In these expectations, the advocates of the practice were soon disappointed, for it was found that, although the pulp had been removed, yet the fangs were just as liable to ache as the tooth, before the excision was made. The practice, therefore, has been abandoned, and the operation is now never performed, except on the front teeth.

Mr. Fox was the first that endeavored to cure odontalgia, by raising the tooth sufficiently in its socket to break the vessels and nerves that enter the extremities of the fangs, and then immediately pressing it down again to its former position. His hopes of success were, at first, very sanguine. He thought that, if he

* Littell's Museum of Foreign Literature and Science. August, 1827.

destroyed the nervous connection between a tooth and the general system, the tooth would not be liable to ache. The result of his operations disappointed his expectations; he found that, although the paroxysms of pain were not so violent as before, yet the tooth soon became sore, and protruded from its socket. He, therefore, never afterwards performed the operation, except under the most favorable circumstances.

Subsequent experiments have not placed this operation in a more favorable light. The socket is generally much injured by the unnatural revulsion of the tooth, especially if it be one of the molars with its bifurcated fangs. An inflammation of the lining membrane, and an effusion of lymph, follow, the membrane becomes thickened, and the tooth, in consequence, is protruded out of its socket, so that, at each occlusion of the jaw, it strikes its antagonist before the other teeth come together, and thus keeps up a constant irritation, and involves the adjacent parts in an unhealthy action.

My own observation has convinced me, that the chances of success for this operation, even under the most favorable circumstances, are so uncertain, that it ought never to be attempted. In truth, it is now seldom ever performed, except by the ignorant or the inexperienced.

The first of these is the fact that the majority of the cases of this disease are reported from the United States and Canada. This is not surprising, since these countries are the most highly developed in the world, and the most likely to have the resources necessary for the study of this disease. The second fact is that the majority of the cases are reported from the United States and Canada. This is not surprising, since these countries are the most highly developed in the world, and the most likely to have the resources necessary for the study of this disease.

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CHAPTER X.

EXTRACTION OF THE TEETH—THE KEY—FORCEPS—
DIRECTIONS FOR THE USE OF THE KEY—DIRECTIONS FOR THE USE OF THE FORCEPS—EXTRACTION OF THE ROOTS OF TEETH—EXCESSIVE HÆMORRHAGE AFTER EXTRACTION.

THIS operation is, generally, considered as of comparatively little importance, and yet there are but few operations in surgery, that excite stronger feelings of horror and dread, and to which there is a greater reluctance, on the part of the patient, to submit. Persons have been known to be willing to suffer with odontalgia for weeks and months, rather than have the offending tooth removed. The accidents that are daily occurring in the performance of this operation, may, it is true, serve to alarm the timid; but these are attributable to the operator's want of tact, or to his ignorance of the anatomy of the parts upon which he is called to operate. The extraction of a tooth, if conducted by a skillful hand, is a safe and easy operation; but, if attempted by the unskillful, may occasion the most frightful and dangerous consequences.

A case, related by Dr. Fitch,* may perhaps serve to illustrate the above remarks. The subject of it was a

* Dental Surgery, p. 347.

man residing in Bottetourt county, Virginia, who called on a blacksmith, residing in his neighborhood, to extract the second superior molar tooth on the right side of the jaw. "The fangs of this tooth," says Dr. F. "were greatly bifurcated and dovetailed into the jaws, and would not pass perpendicularly out, though a slight lateral motion would have moved them instantly. The jaw proved too weak to support the monstrous pull upon it, and gave way between the second molar tooth and first molar, and instantly both the anterior and posterior plates of the antrum gave way. The fracture continued to the spongy bones of the nose, and terminated at the lower edge of the socket of the left front incisor, carrying out with the jaw, six sound teeth, namely, the first molar, the two bicuspid, one canine, one lateral, and one front incisor, six in all. The soft parts were cut away with a knife. A severe hæmorrhage ensued, but the patient soon recovered, though with excessive deformity of his face and mouth."

Dr. Cross, of Jackson, Northampton county, North Carolina, a few months ago, related to me a case, so very similar, to the one just quoted, that I was inclined to believe that it was the same, until I recollected that the one occurred in Virginia, and the other, in the county in which Dr. C. resides. The operator in this, as in the other instance, was a blacksmith, who, in attempting to extract one of the superior molar teeth, brought away a piece of the jaw, containing five other teeth, together with the floor, and the posterior and anterior plates of the antrum. The piece of bone thus detached, is now in the possession of a physician, residing about eight miles from Jackson.

I have adverted to these cases, merely to show the impropriety and danger of entrusting the operation of extraction to individuals possessing neither knowledge of its principles, nor skill in its performance. Injuries of the jaws, occasioned by the operations of such persons, have frequently come under the immediate observation of the author, to whom it has always been a matter of surprise, that an operation to which such an universal repugnance is felt, should ever have been confided to them.

The removal of a wrong tooth, or of two, and even three, instead of one, are occurrences of so common notoriety, that it were well, if the precautions given by the illustrious Ambroise Paré, met with more strict attention. So fearful was he of injuring the adjacent teeth, that he always isolated the tooth to be removed, by the use of the file, before he attempted its removal. He regarded it as of the greatest importance, that a person, who extracted teeth, should be expert in the use of his "tooth mullets; for," says he, "unless he knows readily and cunningly how to use them, he can scarcely so carry himself, but that he will force out three teeth at once." Although great improvements have been made, since his time, in the construction of instruments for extraction, yet even now the accidents to which he alludes, are of no uncommon occurrence.

It is truly surprising, that an operation which is so frequently required as this, should receive so little attention from medical practitioners, by whom, though not strictly belonging to their office, it must frequently be performed. This neglect can only be accounted for, by the too general prevalence of the supposition;

that little or no surgical tact is necessary for its due performance.*

The next thing that claims our notice, is the instruments most commonly used in extraction, the principal of which are, the key and the forceps.

THE KEY.

The tooth-key is an instrument found in the hands of most persons who pretend even to the lowest degree of skill in the healing art; and there is, perhaps, scarcely a day passing, in which teeth are not broken, and jaws splintered, and gums bruised, even to sloughing, by the unskillful, or awkward use of it. The common tooth-key may be regarded in the light of a wheel and axle; the hand of the operator acting on two spokes of the wheel, to move it, while the tooth is fixed to the axle by the claw, and is drawn out as the axle turns. The gum and alveolar process of the jaw, form the support on which the axle rolls.—*Arnott*.

Different dentists have their keys differently constructed. Some prefer the bent shaft, others the straight. Some give a decided preference to the round fulcrum, others to the flat. And though the success of the operator depends greatly upon the perfection of his instruments, yet he can much more expertly remove a tooth, by means of a key with which he is familiar,

* A man who operates leisurely a few times on the dead subject, will often be able to give instant and safe relief to most intense suffering. And it is hardly excusable in any medical man, who may be placed where a professed dentist cannot be procured, to neglect acquiring a talent so easy.—*Arnott*.

than by one to which he is unaccustomed; though it may be much better constructed.

I have tried almost every variety of key-instruments that have been introduced into this country; and I am compelled to say, that I think the straight shaft, and small round fulcrum, to be decidedly preferable to any other. The objection, which has been raised against its use, that it is liable to injure and interfere with the front teeth, is, in my opinion, without any good foundation. It can be used with as much safety as any of the others, and, from its easy introduction into the mouth, in many cases, where they cannot be applied. The round fulcrum is, I think, preferable to the flat, because it is less liable to injure the gums, and alveolar processes. Its size should be that of about a half ounce bullet. The hooks or claws of the instrument, should be of such different sizes; correspondent to the teeth upon which they are to be used, that, when they are applied, their points may be nearly on a level with the lower edge of the fulcrum.

FORCEPS.

The forceps were not, until the last seven or eight years, very commonly or extensively employed. But the improvements that, during this period, have been made in their construction, are so great, that their use has now, with many practitioners, altogether superseded that of the key.

Those that were formerly used, were so awkwardly shaped, and badly adapted to the teeth, that the extraction of a large molar by means of one of them, was so exceedingly difficult, and even dangerous, that, ten years ago, its practicability was doubted by many of the most experienced practitioners, who, consequently, for this purpose, seldom ever resorted to any other instrument than the key.

When we consider the strong prejudices to the use of the forceps, that so recently existed, it is not at all wonderful that their use should have been admitted by the profession with caution. Nor is it at all unnatural, that a gentleman of Mr. Bell's intelligence and practical experience, should, so late as the period of the publication of his work, 1830, tell us, that the key is the only instrument to be relied on for the removal of teeth that are much decayed, and that those, who have heaped the most opprobrium upon it, are glad to have a concealed recourse to its aid.

This may have been true at the time Mr. B. wrote, but it is not now. I have known the forceps often to succeed, after the key had been used by skillful practitioners without effect. I have employed the forceps for more than five years, and I do not hesitate to say, that they will, in most cases, extract any tooth, that can be removed by means of the key, with greater ease to the operator, and less pain to the patient. The key, however, can be used by an inexperienced hand, with rather more facility than forceps.

It is generally supposed, that a greater amount of force is necessary to remove a tooth with the forceps, than with the key; but my own experience leads me to believe, that it does not require as much. All that

is gained by the lever of the key, is more than compensated for, by the loss of power that is occasioned by its force not being applied perpendicularly. Whereas the power with forceps is applied directly, upwards or downwards, to break up the connection of the tooth with its socket, and overcome the resistance of the alveolar walls to its egress.

It may perhaps require a little more practice to be skilled in the use of the forceps, than in that of the key. I would, therefore, advise any one, who has been accustomed to the key, not immediately to lay it entirely aside; but first to commence the use of the forceps on teeth that are least difficult of removal, as, for instance, the bicuspides, and then he will be more likely to succeed with the molares.

Many practitioners have condemned the forceps, because they could not, after three or four trials, remove a tooth as easily with them, as with the key, to which, perhaps, they had been accustomed for many years. But I do not know a single individual, how much soever he might have been prejudiced against them, who has given them a fair trial, that has not yielded them a decided preference.

But, in order that the forceps may be used with ease, it is necessary that they should be of a proper shape and construction. The operator should possess several pairs, (seven at least,) each with different shaped beaks. In the construction of no part of these instruments is as much care necessary, as in that of the nibs. These should be so shaped, as to fit the necks of the teeth they are respectively designed to remove.

For the extraction of the molares, the forceps, recommended by Mr. Snell, are the best in use. For

the removal of the upper molares, "a strong pair," says he, "is required, just sufficiently curved to keep the handles free from the lower teeth. The practitioner should be provided with two pairs, one for each side; the termination of the inner chop, should be in a flat groove, similar to the shape of the tooth on that side where the single large fang is situated. The outer chop should terminate in two grooves, with a fine point in the centre."

The beaks of the lower molar forceps, recommended by him, "are terminated by a double groove, with a fine point in the centre of each, so situated, that, as the lower molar teeth have two fangs only, the points may be introduced between them. * * *

"Two pairs are required for the extraction of these teeth, one for each side, on account of the hook to turn round the little finger, which it will be evident, must be on opposite sides of the instrument, for the opposite sides of the mouth." This, however, is not at all necessary. The handles of the instrument may be so constructed, that its application will be as easy on one side of the mouth, as on the other.

The improvements made by Mr. Snell, in the construction of the beaks of the upper and lower molar forceps, entitle him to much credit,—more than the profession generally seem willing to award him. Another, and very valuable improvement of his, is the bending of one of the handles so as to form a hook. This is intended to pass round the little finger of the operator's hand so as to prevent it from slipping.

The handles of the forceps should be only just large enough to prevent their springing in the hand of the

operator, when the instrument is applied to a tooth, and their length from the joint should never exceed five inches and a half. The curvature between the joint and nibs should be no more than is absolutely necessary; for, in proportion to its greatness, the operator's control of the instrument is lost, and the power disadvantageously applied.

A too great curvature is a much more serious fault than perhaps most dentists are disposed to consider it. They should be very careful to give such directions to the manufacturer, as will prevent it; and it would be well if they could superintend, in person, this part of the fabrication of their instruments, and also the formation of the beaks. The bending of the handles of the lower molar forceps, equally demands their care. These should be formed in such a manner, that they may, when the instrument is applied, be so turned towards the operator, standing on the right side of the patient, as to form an angle of about forty degrees with the medial line of the mouth.

For the extraction of the upper incisors and cuspidati, one pair of forceps only is necessary. These should be made straight, with beaks grooved on the inside, and accurately to fit the necks of the teeth. Their extremities should be very pointed, so that, when it becomes requisite, from the decay of the tooth, they may be easily introduced up under the gum. The removal of these teeth, however, seldom becomes necessary, unless their crowns have been entirely destroyed, and their roots much injured by caries; and then recourse must be had to instruments, that will hereafter be described.

The hawk's-bill forcep is more suitable for the extraction of the incisors of the lower jaw, than any other instrument. Its nibs should be slightly grooved, and in order not to injure the adjacent teeth, they should be made very narrow.

The same sort of forceps should be used for the removal of the cuspidati of the lower jaw, except the beaks, these should be much wider, especially the under one that always rests upon the outside of the tooth. They should also be a little more grooved.

Forceps, for the extraction of the bicuspid, should have their beaks so bent as to be easily adapted to these teeth, and in order to which, they should be a little deeper grooved than those for the upper incisors and cuspidati; but they should, like them, be very pointed at their extremities. One pair, with straight handles, is amply sufficient for the extraction of these teeth, both in the upper and lower jaws.

For the drawing of the *dentes sapientiæ*, either of the upper or lower jaw, the forceps last described, may be conveniently used.

There is another kind of forceps, that are not essential to good practice; which, nevertheless, will often be found to be very convenient, especially for the extraction of the bicuspid, the upper *dentes sapientiæ*, and the roots of the teeth. This instrument is bent between the joints and nibs, so as to form nearly two right angles, the beaks being on a line parallel with the handles.

An almost endless variety of forceps and other instruments, have been invented, and recommended for the extraction of teeth. They will not, however, be here described, as my object is only to notice such as are

most useful to the practitioner. Every dentist should provide himself with as many instruments as are actually necessary. They should be carefully selected of the most approved kind, and the use of each should be perfectly familiar to him. A too great number of instruments, often causes the mind of the operator to vacillate, and to be at a loss to know which can be best employed. Whenever I hear a person boast of the variety of his instruments, I at once conclude, that either he is ignorant of their use, or that he wishes us to believe that he is possessed of an amount of skill proportioned to their number.

PROPER MANNER OF USING THE KEY.

The directions for the use of the key are few and simple; but, as cases must arise to which no general rules can be applied, much will depend on the practical judgment, and surgical tact, of the operator. Before it is used, the gum should be carefully cut from around the neck of the tooth, so that it may not be bruised by the bolster of the instrument, or lacerated by the tearing away of the tooth. I have known, where this has been neglected, portions of the gum, nearly two inches in length, to be torn up along the sides of the other teeth.

After the tooth has been thus prepared, the key, with the proper hook attached, should be firmly fixed upon it, the bolster, on the inside, resting upon the edge of the alveolus, the extremity of the claw, on the oppo-

site side, pressed down upon the neck. The handle of the instrument should now be grasped with the right hand, and the tooth, by means of a firm, steady rotation of the wrist, raised from its socket. In order to prevent the claw from slipping, (an accident that too frequently occurs,) it should be pressed down with the forefinger or thumb of the left hand of the operator, until, by the rotation of the instrument, it becomes securely fixed to the tooth.

If the tooth be situated on the left side of the mouth, the position of the operator should be at the right side of the patient; but if it be on the right side of the mouth, he should stand before him.

For the removal of a tooth, on the left side in the lower jaw, or on the right side in the upper, the palm of the hand should be beneath the handle of the instrument, and *vice versa*, for, in the extraction of one on the right side in the lower jaw, or the left side in the upper, the manner of grasping the instrument is perhaps of more consequence than many imagine. If it be not properly done, the operator loses, to a great extent, his control over the instrument, and the power must be disadvantageously applied.

The directions here given, are, in some respects, different from those laid down by other writers; yet I am convinced, from my own experience, that they will be found more conducive to the convenience of the surgeon, and the success of the operation.

There is a great diversity of opinion as to whether a tooth should be removed inwards or outwards. Some direct the fulcrum of the instrument to be placed on the outside of the tooth, others on the inside, while

others again, regard it as of but little importance on which side it is placed. I, however, think that the fulcrum should generally be placed on the inside, especially of the lower teeth, as they almost always incline towards the interior of the mouth. Moreover, the alveolar parietes of these teeth are usually a little higher on the exterior edge of the jaw than on the interior, so that, the first motion of the instrument, with its fulcrum on the outside, brings the side of the tooth against its socket, and thus, nearly double the quantum of power is required to remove it, while, at the same time, the pain of the patient, and the chances of injury to the alveolar processes, are very much increased.

The alveolar walls of the upper teeth are generally like those of the lower, except that they are much thinner, and thus do not afford so strong a support to the fulcrum of the instrument.

It is, however, frequently necessary to place the bolster of the instrument on the outside of the tooth; especially when it is decayed in such a way, that there is not a sufficiently firm hold for the claw of the instrument when placed there. But, whenever the removal of a tooth inwards is possible, it should always be preferred.

DIRECTIONS FOR THE USE OF THE FORCEPS.

In describing the manner of using these instruments, I shall commence with an account of those most generally employed for the extraction of the incisors of the

upper jaw. These are more easily extracted than any of the other teeth.

After the gum has been separated from the neck of the tooth, it should be grasped only just tight enough to prevent the instrument from slipping, and then pressed outwards and inwards, until it begins to give way, when a slight rotary motion, and a sudden jerk, will remove it with ease.

If the tooth be much decayed, it should be grasped as high up under the gum as possible, and no more pressure applied to the handles of the instrument, than may be necessary to prevent it from slipping. Teeth are often unnecessarily broken by not attending to this precaution.

A much greater force is necessary for the extraction of a cuspidatus, than for that of an incisor. The instrument, however, is applied in the same manner, but in the removal of the tooth, the rotary motion should not be so great.

The manner of extracting the lower cuspidati, is so like that of the upper, that directions that will answer for one, will be found applicable for the other. The upper, however, are generally rather more firmly fixed in their sockets than the lower.

Very little rotary motion is required for the extraction of the bicipides, especially those of the upper jaw. When these teeth are decayed, as they often are, on the inside, nearly to the neck, much management, and surgical tact, is necessary for their removal. The operator is sometimes obliged to seize the lower edge of the alveolus with the forceps; but, ordinarily, they are very easily extracted.

The upper molares, from their being very firmly fixed in the alveoli with three roots, generally require a greater amount of force for their removal, than any of the other teeth. They should be grasped as near the fangs as possible, and then pressed inwards and outwards, until they become loosened, when they may easily be taken from their sockets. If the forceps employed for the extraction of these teeth, be of the right kind, and properly fixed, before any force is applied, they will be found the most safe and successful instruments that can be used.

The superior *dentes sapientiæ* have generally only a weak attachment to the jaw, and consequently require but little force for their removal. The operation should be conducted in a similar manner to that for the removal of the teeth just mentioned.

For the removal of the lower incisors, the force should be directed inwards and outwards, until their connection with the sockets be destroyed, and then it should be applied upwards. These teeth, on account of their frequent irregularities, are usually rather difficult to remove.

The molares and *dentes sapientiæ*, of the lower, should be extracted in the same manner as those of the upper, jaw.

No precise directions can be given for overcoming the obstacles that occasionally present themselves, in the performance of the operation, just described. The peculiarity of each case can alone suggest the proper means, of which the practitioner should avail himself.

Before concluding my remarks on the use of the forceps, I would observe, that the position of the operator should usually be on the right side of the patient. He cannot, when facing him, as some have directed, possess one-half the control over his instruments.

EXTRACTION OF ROOTS OF TEETH.

Roots of teeth, though generally much more easily removed than whole teeth, are nevertheless sometimes exceedingly difficult of removal. Their extraction requires instruments entirely dissimilar to any that have hitherto been described. Those which are most commonly used, and which I have found best adapted to the purpose, are the hook, punch, elevator, and screw. These instruments are too well known to need any description. Every dentist has them somewhat differently constructed, according to his own peculiar fancy or taste. They should be of a convenient size, made of good steel, and so tempered, as neither to bend nor break.

The hook is chiefly used for the extraction of the roots of the molar and bicuspid teeth, on the left side of the mouth; the punch, for the removal of roots on the right side; the elevator, for extracting of those on either side, as occasion may require; and the screw for the drawing of the roots of the front teeth in the upper jaw.

The necessary tact for the skillful use of these instruments can only be acquired by practice. Great care is requisite to prevent them from slipping and injuring the mouth. When the punch or elevator is used, the forefinger of the left hand should be wrapped with a cotton or linen rag, and placed on the side of the root, opposite to that on which the instrument is applied; so that it may catch it if it should glance.

For the removal of the roots of the molar and bicuspid teeth, the hook and punch will ordinarily be found sufficient; but if they are firmly seated in the jaws, and cannot be grasped by the forceps, recourse must be had to the elevator. It is necessary, for the proper use of this instrument, that there should be an adjoining tooth or fang, which should be used as a fulcrum. When this can be obtained, the largest roots, and sometimes whole teeth, may be removed by it, with the greatest facility.

Six or eight years ago, an instrument, called the double-elevator, was very popular, but it is now seldom used. Mr. Snell recommends it very highly, for the removal of the *dentes sapientiae* of the lower jaw. My own experience of its utility, does not allow me to speak of it in the same favorable terms.

For the extraction of the roots of the upper front teeth, the screw is invaluable. By it a firm hold upon them is obtained, which cannot be gained by any other instrument. It should be screwed into their cavities. But, before it is applied, it sometimes becomes necessary to enlarge the interior of the fangs in order that it may have a firm hold; this being once secured, the root is easily removed.

The deciduous teeth should be extracted in the same

manner as the permanent ones, and with similar instruments, though of a smaller size. If the power be properly directed, very little force is required for their removal, because the roots of these teeth are generally removed by the absorbents, before the operation is called for, and when they remain, the alveolar processes, at this early age, are so soft and yielding, as to offer very little resistance to their extraction.

The operator should be very careful not to injure the pulps of the permanent teeth, or the jaw-bone. Serious accidents sometimes occur, from an improper or awkward removal of these teeth. But, as has been before remarked, their extraction is seldom required. It is only admissible, when necessary for the relief of tooth-ache, the cure of alveolar abscess, to prevent irregularity in the permanent teeth, or when there is an exfoliation of the jaw-bone.

EXCESSIVE HEMORRHAGE FROM EXTRACTION.

It rarely happens, that much bleeding is occasioned by the extraction of a tooth. Indeed, it is oftener more desirable to promote it by rinsing the mouth with warm water, than to attempt its suppression. Nevertheless, cases do sometimes occur, in which it becomes excessive and alarming; and it has even been known, in some instances, to have terminated fatally.

Excessive hemorrhage from the extraction of a tooth, does not appear to be dependent upon the manner in

which a tooth is extracted; but seems rather to be attributable to constitutional temperament. Hence, whenever a tendency to it exhibits itself in one member of a family, it is usually found to exist in all. Of the many cases which have fallen under my own observation, I shall mention only one.

In the fall of 1834, Miss I—, a young lady of about fifteen years of age, called on me to remove the second molaris on the left side of the upper jaw. The hemorrhage, immediately after the operation, was not greater than that which usually occurs, and in the course of a half or three-quarters of an hour, it altogether subsided. But at about twelve o'clock on the following night, it commenced again, in such a manner as to excite considerable alarm. A messenger was immediately sent to ask my advice, and I directed the alveolar cavities to be filled with pledgets of lint, saturatad with the tinct. of nut galls. Two days after, at about six o'clock in the morning, I was hastily sent for by the young lady's mother, and, on my arrival at her residence, I was informed that the bleeding had now been going on for about four hours, and that, during this time, more than two quarts of blood had been discharged. The blood was still oozing very fast. After I had removed the coagula, I filled the alveolus with pieces of sponge, saturated as the lint before had been, with tinct. of nut galls. When the pieces of sponge had been firmly pressed in, and secured by a compress, the hemorrhage immediately ceased. These were permitted to remain until they were expelled by the suppurative and granulative processes.

I afterwards had occasion to extract one tooth for a

sister, and two for the mother, of the young lady, and a bleeding similar to that just described, occurred in each case.

I have had, perhaps, some fifteen or twenty cases of this kind, but never found it necessary to adopt any other course of treatment than that detailed in the case just narrated. More powerful remedies, however, are sometimes employed. Some practitioners use a solution of the sulph. cupri, or of the nitrate of silver, while others employ the actual cautery. Pressure, after all, I believe, is the only thing on which we can rely. If it be so applied, as to act directly upon the mouths of the bleeding vessels, it will be found to be more efficacious than the most powerful styptic, or any other remedy to which we can resort.

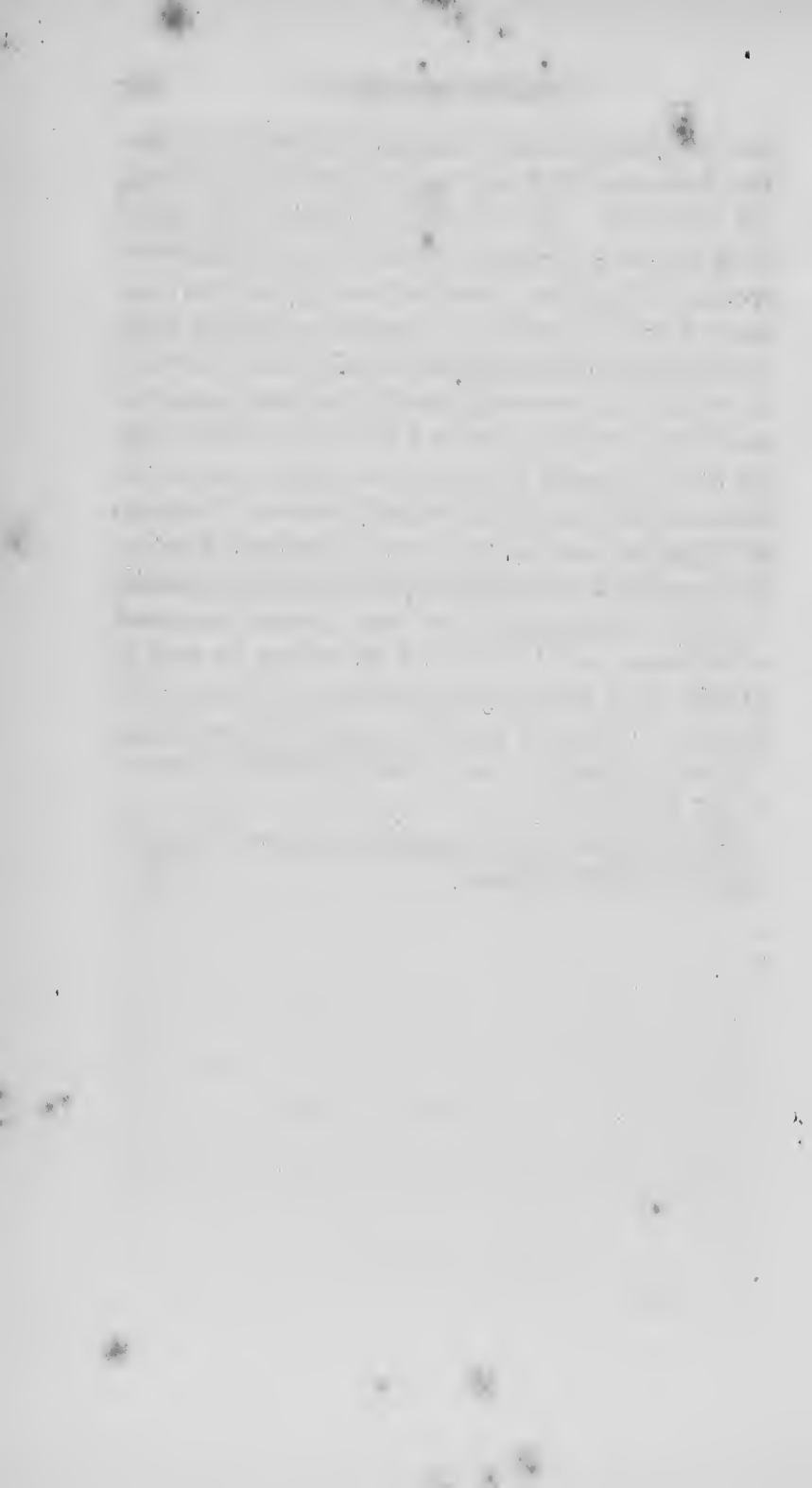
The following case is quoted by Dr. Fitch* from *Le Dentiste Observateur par H. G. Courtois, Paris, 1775*.

"A person, living in Paris, called on me to extract a canine tooth for him. On examining his mouth, I thought that this man was attacked with scurvy: but this did not seem sufficient to hinder the person from having his tooth extracted; much less would he have consented to it, on account of the pain which his tooth gave him. After the tooth was extracted, it did not appear to me that it bled more profusely than is customary after similar operations. In the meanwhile, the following night I was called upon to see the patient, who had continued to bleed ever since he left me. I employed, for stopping this hemorrhage, the agaric of

* Dental Surgery, p. p. 251, 252.

the oak bark, which I commonly used with success. The following day I was again sent for, the bleeding still continued. After having disburdened the mouth of all the lint pledgets, which I used for making compression at the place where the blood appeared to come from; I made the patient take some mouthfuls of water to clear his mouth of all the clots of blood with which it was filled: I perceived then that the blood came no more from the place whence I had extracted the tooth, but from the gums; there was not a single place in the whole mouth, from which blood did not issue. I called in the physician, who ordered several bleedings in succession to each other, besides astringents, which were taken inwardly; and gurgles, of the same nature, were used; but all these remedies, like all the others he took to give the blood more consistence, were all used to no purpose. It was not possible to stop this hemorrhage. The patient died the ninth or tenth day after the extraction of the tooth."

Mr. Snell also mentions a similar case, which terminated in a similar manner.



CHAPTER XI.

NECROSIS OF THE TEETH—EXOSTOSIS OF THEIR ROOTS—SPINA VENTOSA—LOSS OF THE ENAMEL BY THE DENUING PROCESS—SPONTANEOUS ABRASION OF THE CUTTING EDGES OF THE FRONT TEETH—MECHANICAL ABRASION—FRACTURES AND OTHER INJURIES FROM MECHANICAL VIOLENCE—FUNGIOUS GROWTH OF THEIR PULPS.

By the term necrosis, when applied to the teeth, is meant the entire death of one or more of these organs. It is a disease common to all bones, and is similar to mortification in a soft part.

When it affects any bones, other than the teeth, the dead part is thrown off, and the loss repaired by a deposition of new matter. But, when it attacks the teeth, there is no such restoration. These organs, as has before been shown, are endowed with no recuperative powers, which can renew the part destroyed; and even if they were, necrosis would still deprive them forever of vitality, because they, unlike other osseous structures, are affected by it, at once, in every part.

It does not in the least affect their density, but it produces so great a change in their appearance, that a tooth thus affected, may be detected by the most casual observer. It causes them to assume a dark, bluish, or dingy hue, according to the hardness of their structure, and the causes concerned in the production of their death. This change is much more striking in teeth that are soft, than in those that are hard. It is also more marked in those that have lost their vitality by the sudden operation of some cause, as, for instance, a blow, by which the return of the blood from the arteries to the heart, has been prevented, than it is in those which have lost their vitality in a more gradual manner.

The front teeth, from their being more exposed to injuries from blows, are more liable to necrosis than those that are farther back in the mouth. It is also more frequently met with in sound teeth, than in those that are decaying. This fact may appear strange, yet I think it capable of a satisfactory explanation.

It has been before shown, that soft teeth are more liberally supplied with blood vessels, nerves, &c., and are more easily acted upon by external agents, than those that are hard. Hence it will be seen, that if soft teeth, on account of their higher organization, are more susceptible to the action of corroding agents, they are also, for the same reason, less liable to be deprived of their vitality.

Necrosis of the teeth may be produced by a variety of causes, such as protracted fevers, the immoderate exhibition of mercurial medicines, and by caries. The

immediate cause, however, in all cases in which it is not occasioned by a blow, sufficiently violent to destroy, at once, the vascular connection of the tooth with the rest of the system, is inflammation and suppuration of the lining membrane.

When once the vascular connection of a tooth with the rest of the system is destroyed, it becomes an extraneous body—inflammation of the socket ensues, and the gum becomes turgid and spongy, and bleeds from the slightest touch. The tooth, as the alveolus is absorbed, becomes loosened, matter is discharged, at different openings, through the gum, or at its edge, the root assumes a dark brown color, and has a rough irregular appearance. A morbid action is also often imparted to the contiguous parts. The sockets of the adjacent teeth frequently become absorbed, the teeth loosened, and the gums tumefied and spongy.

I have, in some instances, known teeth to remain firmly fixed in their sockets for years, after having been deprived of their vitality, without producing any very unpleasant consequences. Cases of this sort, however, are of so rare occurrence, especially with the molars and bicuspid, that I am disposed to believe that, in such instances, there is always a low degree of vitality kept up by the periosteum of the fangs, after the separation of the internal membrane. This hypothesis appears the more probable, when we reflect, that something of the same sort often happens in the roots of teeth long after the destruction of their crowns.

When a tooth, deprived of its vitality, is found to be productive of injury to the gums and to the adjacent teeth, it should be immediately removed; for, how important or valuable its presence may be, the health and durability of the others should not be jeopardized for its retention.

If a necrosis of one or more of these organs is apprehended, we should endeavor, by the application of leeches to the gums, and washing the mouth with suitable astringents, to prevent its occurrence. When this plan of treatment is adopted at an early period, it will generally prove successful; but, if it be long neglected, no favorable result can be anticipated.

EXOSTOSIS OF THE ROOTS OF THE TEETH.

Exostosis, unlike many of the other diseases to which the teeth are subject, is not exclusively confined to them, but is common to other bones of the body. It never attacks any part of the teeth other than the roots. It usually commences at their extremities, and sometimes extends itself over the whole of their external surfaces; most commonly, however, it covers but a small portion of the root. But yet there is, sometimes, so great a deposite of osseous matter, that protuberances of the size of a small pea, are formed. The bone, thus deposited, is harder than that of the root, and has a faint, yellowish, semi-transparent appearance.

This disease often continues for a long time without producing any inconvenience whatever. It usually first manifests itself by a slight soreness in the affected tooth, which increases as the fang becomes enlarged, until pain, either constant or periodical, and of a character more or less severe, is experienced.

The most remarkable case of exostosis of the roots, on record, is that related by Mr. Fox.* The subject of it was a young lady, who, at the time she came to Mr. F., had suffered so much and long, that the palpebræ of one eye had been closed for near two months, and the secretion of saliva had, for some time, been so copious, that it flowed from her mouth, whenever opened. She had tried every remedy within the province of medicine, without experiencing any permanent benefit, and was finally relieved from her suffering, only by the extraction of all her teeth.

In the course of my practice, I have removed many teeth that were affected with exostosis, but I have never met with a case similar to that narrated by Mr. F. In one instance, I was compelled to extract four sound teeth and nine roots; yet the pain was not, at any time, severe, though constant in its character, and a source of great annoyance to the patient.

The primary cause of this disease does not appear to be well understood. But most writers concur in attributing the proximate cause to inflammation of the periosteum of the fang. This inflammation is not, as some authors suppose, dependent upon any morbid condition of the crowns themselves; for it often attacks teeth that are perfectly sound. It seems rather to be attributable to some peculiar constitutional tendency.

* History and Treatment of the Diseases of the Teeth, p. p. 45—50.

SPINA VENTOSA.

Spina ventosa is spoken of by Mr. Fox as being a disease that is peculiar to the other bones, but which, sometimes, attacks the teeth. I, however, think the term wrongly applied by him. Spina ventosa, according to the common acceptation, is an ulcerated tumor, by which the substance of a bone is internally destroyed, while, at the same time, its external substance is gradually enlarged.

The disease, which Mr. Fox designates spina ventosa, is thus described by him: "The seat of the malady is in the cavity of the tooth; the vessels ramifying on its membrane, acquire a diseased action, by which the membrane becomes thickened, absorption of some of the internal parts of the tooth takes place, and the opening, at the extremity of the fang, also becomes enlarged. This disease of the membrane is attended with the formation of matter, discharging itself at the point of the fang, into the alveolar cavity, which, being rendered more porous by the process of absorption, affords an easy exit. During the progress of the disease, the gum, covering the alveolar process, becomes inflamed, and acquires a spongy texture; the matter, passing from the socket, makes its escape into the mouth by several openings through the gum, which is thus kept in a constant state of disease."

Hence, it will be perceived, that there is little or no analogy between spina ventosa and the disease spoken

of by Mr. F. under that name. The latter is nothing more than the effects of alveolar abscess, produced by inflammation and suppuration of the lining membrane.

The enlargement of the opening at the extremity of the fang, is not, as Mr. Fox believes, caused by the action of the absorbents. Before it takes place, the membrane that lines the canal of the root, has been separated from its parietes, and thus the vital powers of the fang (if after this it can be said to have any) have been so much reduced, as to preclude the possibility of the foramen's being enlarged in the manner that Mr. F. supposes.

We can, therefore, attribute this enlargement only to the action of the confined matter, or rather to some corrosive property possessed by it. This explanation appears the more probable, when we consider that the matter, discharged from the socket, is ichorous, offensive, and very corrosive.

Moreover, spina ventosa is characterized by an enlargement of the bone on the outside, while, in this disease of the teeth, there is none. The external appearance of the crown and root is like that described under the head of necrosis.

This affection of the teeth, designated by Mr. Fox as spina ventosa, is, therefore, nothing more than necrosis, produced by alveolar abscess. Hence, the treatment should be similar to that described in the last section of the present chapter.

LOSS OF THE ENAMEL BY THE DENUDING PROCESS.

This is one of the most remarkable affections to which the teeth are liable. It consists in a gradual wasting away of the enamel on their outer surfaces. The disorder usually first attacks the central incisors, and thence extends to the laterals, the cuspidati, bicuspidates, and, sometimes, even to the first and second molares. It generally forms a continuous horizontal groove, which is as regularly and smoothly constructed as if it had been made with a file. After it has removed the enamel, it commits its ravages upon the body of the tooth itself, and sometimes penetrates nearly half way through its substance. The color of the enamel is rarely ever changed by it; but the bone, as it becomes exposed, assumes a dark brown and highly polished appearance.

This affection sometimes manifests itself in a single point, from which it proceeds in a horizontal direction, until it has extended to all the teeth that are commonly subject to its attacks. At other times, it commences in a number of points, which afterwards unite, and give the enamel the semblance of having been scooped out with a broad round pointed instrument.

The cause of this singular phenomenon has never been satisfactorily explained. It was first noticed by Mr. Hunter, who called it decay by denudation, and supposed, "from its attacking certain teeth rather than others, and from its being confined to a particular

tooth," that it is a disease inherent in the tooth itself, and not dependent on circumstances in after life.

Mr. Bell thinks that Mr. H. has confounded the affection, now under consideration, with another similar in its appearance, but arising from a wholly different cause: he remarks:

"I have seen instances,' says Mr. Hunter, 'where it appeared as if the outer surface of the bony part, which is in contact with the inner surface of the enamel, had first been lost, so that the attraction of cohesion between the two had been destroyed; and, as if the enamel had been separated for want of support, for it is terminated all at once.' In this passage, Mr. Hunter describes very accurately the result of superficial absorption of the bony structure, a circumstance which I have occasionally seen, though more rarely than the present abrasion of the enamel, with which it cannot, for a moment, be considered as identical. In one case, the enamel is gradually and slowly removed by a regular and uniform excavation: in the other, the abruptness and irregularity of the edges, show that it had broken away at once, from having lost its subjacent support. The cause of the former is external; in the latter, it is within the enamel."

Mr. Bell, in attempting to correct one error, has fallen into another, equally as great and palpable. He attributes the breaking in of the enamel, which we sometimes meet with, to an absorption of the subjacent bone, instead of ascribing it to caries, the true cause.

In almost every instance, where I have found the edges of the enamel in the condition spoken of by Messrs. Hunter and Bell, I have also observed, that the

surface of the exposed bone of the tooth exhibited symptoms of decay. I have also known several instances, in which the enamel did not break in, but, on removing it, I found the bone underneath decomposed.

In both these sorts of cases, we are at no loss to account for the cause. The enamel is very thin, it becomes so injured, from some cause, that the secretions of the mouth are admitted, and then, as has been before shown, decay almost surely follows.

But this breaking in of the enamel, is not the affection, of which we are now treating. The one is nothing more than the effect of common decay; the other seems to result from a sort of spontaneous abrasion.

Mr. Bell is unfortunate also in the suggestions, which he throws out, in regard to the cause of it. "Whatever may be the cause," says he, "and, at present, I confess myself at a loss to explain it, the horizontal direction in which it proceeds, may, I think, be connected with the manner in which the enamel is deposited during its formation: for it will be recollected, that it first covers the apex of the tooth, and gradually invests the crown by *successive circular depositions*; it is, therefore, not improbable, that from some temporary cause, acting during its deposition, certain circular portions may be more liable to mechanical abrasion, or other injury, than the rest."

These conjectures of Mr. B., though plausible, do not satisfy the mind of the inquirer. If, as he supposes, certain circular portions of the enamel are less perfectly formed than others, and, consequently rendered more liable to this disease, it would not be confined only to the anterior surface of the tooth, but extend entirely

around it, and, as soon as these imperfectly formed circular portions were destroyed, its ravages would cease. Moreover, it not only attacks the enamel on the anterior part of the teeth, but also often destroys a considerable portion of the bone.

Mr. Fox frankly acknowledges his inability to assign any cause for this affection; but conjectures, that it is dependent on some solvent quality of the saliva. Were his supposition correct, every part of the tooth would be alike subject to its attacks.

Other writers suppose that it is occasioned by the friction of the lips. But this supposition is liable to the same objections as that of Mr. F. Furthermore, the narrowness and depth of the groove are sometimes such, that they preclude the possibility of the contact of the lips with its interior surfaces. Some authors, again, believe it to be attributable to the use of tooth brushes; but these opinions are as ill founded as those of the others.

The bony structure of a tooth, after it is denuded of its enamel, is generally quite sensitive, and is very susceptible to the influence of heat and cold.

To prevent this disease, Mr. Fox recommends, that whatever tends to produce it, should be avoided. But he does not inform us what are the causes that occasion it, except by offering vague conjectures, unsupported both by reason and fact. In the advanced stages of the disease, I have generally succeeded in arresting its farther progress, by widening the groove at the bottom, and filling it with gold.

SPONTANEOUS ABRASION OF THE CUTTING EDGES OF THE
FRONT TEETH OF THE UPPER AND LOWER JAWS.

The spontaneous abrasion of the cutting edges of the front teeth, is an affection of very rare occurrence. Its causes are involved in as much obscurity as are those of the denuding process. It commences on the central incisors, and thence passes to the laterals, the cuspidati, and sometimes, though very rarely, to the first bicuspidi. Teeth that are affected by it, have, when the jaws are closed, a truncated appearance, do not come closely together, and are rather more than ordinarily susceptible to the action of acids and of heat and cold. In other respects, little or no inconvenience is experienced from it.

Its progress, so far as I have been able to learn from the few cases that have come under my own immediate observation, and from the history of those which have come under the observation of others, is not always the same. Sometimes it rapidly removes, in the course of a year or two, nearly one-half the substance of the front teeth; at other times, it proceeds more slowly, and does not make any very perceptible impression, until six or eight years have elapsed after its first attack.

The first case of spontaneous abrasion that I ever saw, had occurred only two years before. The central incisors, of the upper and lower jaws, were so much wasted away, that, on the closing of the mouth,

they did not meet by more than three-eighths of an inch. The disease had extended its ravages to the bicuspidis. Another case, that I met with, had continued for seven years; but the abrasion had only reached to the cuspidati, and the space left, on the closing of the mouth, between the upper and lower central incisors, was not more than an eighth of an inch. The subject of the first case was a gentleman aged twenty-eight; that of the other, a gentleman of twenty-one.

Mr. Bell* gives an interesting case of a gentleman whose teeth were affected with this disease:—"About fourteen months since, 1831, this gentleman," says he, "perceived that the edges of the incisors, both above and below, had become slightly worn down, and, as it were, truncated, so that they could no longer be placed in contact with each other. This continued to increase and extend to the lateral incisors, and afterwards, successively, to the cuspidati and bicuspidis. There has been no pain, and only a trifling degree of uneasiness, on taking acids, or any very hot or cold fluids, into the mouth. When I first saw these teeth, they had exactly the appearance of having been most accurately filed down at the edges, and then perfectly and beautifully polished: and it has now extended so far, that when the mouth is closed, the anterior edges of the incisors of the upper and lower jaws are nearly a quarter of an inch asunder. The cavities of those of the upper jaw must have been exposed, but for a very curious and beautiful provision, by which they have become gradually filled by a deposite of new bony matter,

*Anat. Phys. and Diseases of the Teeth, p. p. 188, 189.

perfectly solid and hard, but so transparent, that nothing, but examination by actual contact, could convince an observer that they were perfectly closed. This appearance is exceedingly remarkable, and exactly resembles the transparent layers which are seen in agatose pebbles, surrounded by a more opaque mass. The surface is uniform, even, and highly polished, and continuous, without the least break, from one tooth to another. It extends, at present, to the bicuspidates, is perfectly equal on both sides, and when the molares are closed, the opening, by this loss of substance in front, is observed to be widest in the centre, diminishing gradually and equally on both sides to the last bicuspidates."

Dr. McCabe, a dentist of Richmond, Virginia, in a conversation that I had with him about eighteen months ago, described to me a case that he had seen a short time before, which was very similar to the one mentioned by Mr. B. He also gave me the name and age of the individual affected, and the length of time the abrasion had continued; but these I do not recollect sufficiently accurately to repeat.

"On the cause of this very extraordinary occurrence," says Mr. Bell, "I confess myself wholly at a loss to offer even a conjecture. It cannot have been produced by the friction of mastication, for these teeth have never been in contact since the first commencement of the affection; nor does it arise from any apparent mechanical cause, for nothing is employed to clean the teeth, excepting a soft brush. Absorption will equally fail to account for it; for not only would this cause operate, as it always does, irregularly, but

we find that, instead of these teeth being the subjects of absorption, a new deposition of bony matter is, in fact, going on, to fill the cavities which would otherwise be exposed.”*

MECHANICAL ABRASION OF THE TEETH.

Were it true, as has been asserted by a distinguished physiologist,† that the loss of the enamel, occasioned by friction, is repaired, there never would be any mechanical abrasion of the teeth. His doctrine, however, is overthrown, not only by the consideration of the peculiar formation of the enamel, but also by positive facts.

The teeth are rarely abraded, when the upper front ones overlap, as they usually do, those of the lower. It is only when the cutting edges of these teeth strike upon each other, that a rapid abrasion of their substance takes place; and, it is no unusual thing for their crowns to be entirely worn off, while those that are farther back in the mouth remain almost entire. The reason of this is, that when the upper and lower front teeth meet, the lateral motions of the jaw are not so much restricted, and are greater in the anterior, than in the posterior, parts of the mouth; consequently, there is a greater amount of friction on the front teeth than on the others, and hence their more rapid abrasion.

* Anat. Phys. and Diseases of the Teeth, p. p. 89, 90.

† Vide Richerand's Physiology, p. 82.

Sometimes, the whole of the teeth are abraded alike; at other times, owing to the peculiar manner in which they come together, it is confined to only a few.

Mr. Bell believes that certain kinds of diet, tend, more than others, to produce abrasion of the teeth. To establish his belief, he tells us that sailors, who, the greater portion of their lives, live on hard biscuits, have only a small part of the crowns of their teeth remaining above the edges of their gums.* Certain sorts of diet may, it is true, influence abrasion, but I do not think it to be so much attributable to them, as to the circumstance just noticed.

When the front teeth of the lower jaw strike against the inside of those of the upper, the substance of the latter is sometimes worn more than three-fourths away, and, in some instances, even entirely up to the gum. I have seen the teeth of some individuals so much abraded, in this way, that but little of their crowns, except the enamel on their anterior surfaces, remained.

The wearing away of the crowns of the teeth would expose their lining membranes, were they not previously removed, and the cavities filled with ossific matter, by that singular process of the economy which has been so accurately described by Mr. Bell.† Thus, an event, from which the most painful consequences might result, is so anticipated by a wise provision of nature, as to occasion but comparatively little inconvenience.

*Anatomy, Physiology, and Diseases of the Teeth, p. 191.

†Vide page 211 of this work.

FRACTURES AND OTHER INJURIES FROM MECHANICAL VIOLENCE.

The injuries that the teeth receive from mechanical violence, are so various in their character, that it is impossible to give any thing more than a few general rules for their treatment. Owing to differences in the physical structure of the teeth, and in the constitutional temperaments of individuals, blows, of the same degree of violence, produce very dissimilar effects upon these organs. Thus, for instance, a blow that would be sufficient to loosen a tooth, in the mouth of one person, might not be productive of any permanent injury; while a similar blow, in the mouth of another, might occasion the complete necrosis of one of the teeth.

A tooth that is of a compact texture, and in a healthy mouth, may be deprived of a portion of its substance without any consequent injury; but a similar loss of substance from a tooth, not so dense in its structure, and situated in a mouth whose secretions were vitiated, would be very likely to produce a rapid decay. Hence, in order to accurately prognosticate the results of injuries of this sort, we must take into consideration, not only the character of the teeth upon which they are inflicted, but also the health of the mouth and of the individual.

If a tooth be not loosened in its socket, any injury

that might result from the loss of a small portion of its enamel, or even of the bone, may be prevented by smoothing the fractured surface with a file, so that the juices of the mouth, and particles of extraneous matter, may not be retained in contact with it. But if once the tooth be loosened, inflammation of the investing membrane of its root will supervene, and then leeches must be applied to the gum, and the mouth washed several times a day, with some astringent lotion, until the inflammatory symptoms subside.

When a tooth, by a blow, has been displaced from its socket, and its vascular connection with the general system broken up, necrosis will be very apt to follow. An imperfect union between it and the alveolus, may sometimes be effected, but it will soon assume a sickly appearance, the gum become dark, and an unhealthy action, in most cases, be imparted to all of the contiguous parts. A tooth thus circumstanced, unless it be an incisor or cuspidatus, should never be permitted to remain in the mouth.

I have, on several occasions, replaced teeth that had been knocked from their sockets; but in only one instance was the operation attended with any thing like success. A healthy boy, of about thirteen years of age, while playing bandy, received a blow from the club of one of his playmates, which knocked the left central incisor of the upper jaw entirely out of its socket. I saw the boy about fifteen minutes after the accident. The alveolus was filled with coagulated blood. This I sponged out, and, after having bathed the tooth in tepid water, carefully and accurately replaced it in its socket, and secured it there by silk

ligatures attached to the adjacent teeth. On the following day, the gum around the tooth was considerably inflamed; to reduce which, I directed the application of three leeches to the gum, and a frequent use of diluted tinct. myrrh as a wash for the mouth. At the expiration of four weeks, the tooth became firmly fixed in its socket, but from the effusion of coagulable lymph, the alveolar membrane was thickened, and the tooth, in consequence, somewhat protruded. A slight soreness, on taking cold, has ever since been experienced.

Dr. E. Noyes, an eminent dentist of this city, a few days ago, mentioned to me a case somewhat similar in its character. The subject of it was a boy of about ten years of age. One of his front teeth, by a fall, was forced from its socket. On its being replaced shortly after, it, in a few weeks, became again firm in its alveolus. Mr. Bell* also mentions a similar case, attended with a like result.

The alveolar processes and jaw-bones are often much injured by mechanical violence. About five years ago, I was requested by the late Dr. Baker, of this city, to visit, with him, a lady who, by the upsetting of a stage between Washington and Baltimore, had her face severely bruised and lacerated. All that portion of the lower jaw, which contained the six anterior teeth, was splintered off, and only retained in the mouth by the gum and integuments, with which it was connected. The wounds of her face, having been properly dressed, the detached portion of the jaw was carefully adjusted and secured by a ligature passed round the front teeth

* Anat. Phys. and Diseases of the Teeth, p. p. 181, '2.

and first molars, and by a bandage on the outside, passed round the chin and back part of the head. Her mouth was washed, five or six times a day, with diluted tinct. myrrh. The third day after the accident, by the direction of Dr. B., she lost twelve ounces of blood; and, in about five or six weeks, with no other treatment than the dressing of the wounds, she perfectly recovered.

It often happens, that the crown of a tooth is broken off entirely to the fang. I have known persons to have four and even nine of the crowns of their teeth thus fractured. The crowns, fangs, and alveolar processes, are sometimes ground to pieces, or the teeth driven into the very substance of the jaw-bone. Mr. Bell says that he once found a central incisor so completely forced into the bone, that he thought it to be the remains of a fang, but, on removing it, found it to be an entire tooth.

When the crown of a tooth has been broken off by a blow, the root should be immediately extracted, because the injury that it has received will not permit it to remain with impunity in its socket. I have sometimes engrafted artificial crowns on such roots, but I do not hesitate to say that the practice is, in general, a bad one. When it is desirable that the loss should be repaired by the substitution of an artificial tooth, the root should be extracted, and time allowed for the alveolus to become absorbed, and the gums to be restored to health.

FUNGIOUS GROWTH OF THE PULPS.

When the lining membrane of a tooth becomes exposed, fungous granulations are frequently thrown out, which sometimes are very rapid in their growth, and almost as sensitive as the pulp itself. They, however, usually partake more of the character of the gum, though, on being wounded, bleed more profusely.

The curative indication, in cases of this kind, are so palpable, that no one can hesitate as to what course to pursue. Temporary relief, may, it is true, be afforded by excising the excrescence, but it will soon return. The only remedy that is perfectly effectual, is the extraction of the tooth.

CHAPTER XII.

TARTAR, OR SALIVARY CALCULUS—ITS EFFECTS—
REMOVAL.

SALIVARY calculus is an earthy substance, which is formed upon the teeth; its color varies from a light to a dark brown, and sometimes approaches a black, or assumes a greenish hue. When first deposited on the teeth, it is soft, and may easily be removed by the finger nail, or with a tooth-brush. After a time it acquires a firmer consistence, and in some cases becomes almost as hard as the teeth themselves, requiring considerable force, even when an instrument is used, to remove it. Its external surface is rough, unless worn smooth by the constant friction of the tongue. When first taken from the teeth, it emits a fetid and nauseating smell, but after it has been exposed to the air for a few days, it becomes perfectly inodorous.

It is principally composed of phosphate of lime and

animal matter. The following is the analysis of it, that was furnished by Mr. Pepys to Mr. Fox.*

Phosphate of lime, . . .	39
Fibrina, or cartilage, . . .	9
Animal fat, or oil, . . .	3
Loss,	3
	<hr/>
	50

This substance is found to be more thickly deposited on the inside of the lower front teeth, and on the outside of the superior molares, where, opposite to the mouths of the salivary ducts, its formation always commences.

The source whence it is derived, and the manner of its formation, have been subjects of much speculation, and given rise to some ingenious hypotheses, which, on account of the respectability of their authors, deserve our notice.

C. F. Delabarre, a French writer of high reputation, and an experienced practitioner, has endeavored, by an ingenious course of reasoning, to prove, that tartar is produced by the mucous follicles of the mucous membrane of the mouth, or rather by an exhalation from their vessels while in a morbid state. In support of his theory, he gives the result of a variety of experiments upon the mucous membranes in other parts of the body. The one upon which he seems most to rely, is that performed on the membrane of the bladder. He attributes the deposite of calculus matter upon a sound, when introduced into the bladder, to the irritation produced upon the membrane by the instrument,

* Fox, part 2, p. 114.

by which its vessels are caused to assume an unhealthy action, and to exhale the earthy substance that is found upon it.

This inference, however, as has been conclusively shown by Mr. Bell, is erroneous. In alluding to it, Mr. B. remarks, "the previous non-existence of calculus in the bladder, cannot be deemed any proof that the elements of its composition had not been held in solution in the urine, requiring only the occurrence of any extraneous body in the bladder to serve as a nucleus for its deposition. This view of the subject is amply confirmed by the fact, that depositions, both of the lithic salts and of the triple phosphate, the basis of the usual varieties of urinary calculi, are constantly formed from the urine, after its expulsion from the bladder."

Hence a deposite of urinary calculus on a sound, is not, as we have every reason to believe, occasioned by inflammation of the lining membrane, but is simply the result of the presence of the instrument.

As it regards the manner in which salivary calculus is formed, M. Delabarre is still more unfortunate. Were his views on this subject correct, it would follow, that those persons whose mouths are perfectly healthy, would be exempt from such depositions, and that those with unhealthy mouths, would have the tartar deposited on each side of all their teeth. But experience tells us, that the teeth of every person are alike subject to its depositions. On those of some, it is true, it is found in larger quantities, than on those of others. This, however, is attributable either to the different degrees of attention, which different individuals pay to the cleanliness of their teeth, or to the salivary secretions of some

persons being more strongly impregnated with the elementary principles of this substance, than those of others.

Another evidence of its being a salivary deposite, is, that its formation always commences opposite to the mouths of the stensonian, warthonian, and rivinian ducts, and is sometimes found in the very mouths of the ducts themselves.

From all these facts, we cannot doubt as to the origin of this substance. That it is a salivary deposite, is proved by every circumstance connected with the manner of its formation.

Another theory, which is advanced by M. Serres, differs from the one just noticed, only in that he mistakes the mucous follicles of that portion of the mucous membrane of the mouth, which covers the gums, for minute glands, and supposes their office to be the secretion of tartar. Similar objections are applicable to his as to M. Delabarre's theory.

This substance is sometimes deposited in large masses on the teeth of persons, who are not attentive to keep them clean. It not unfrequently accumulates on the inner surfaces of the lower front teeth, and on the outer surfaces of the superior molares, to more than the thickness of the eighth of an inch, and occasionally completely envelopes every tooth in the mouth. Instances of this kind are, however, comparatively rare; but we often see it in such abundance, that the mouth of the individual presents a most unseemly and often disgusting appearance. It occasionally forms large protuberances on the outer surfaces of the upper molares, which have been often mistaken for bony tumors.

There is a kind of tartar, of a greenish cast, which

more resembles a stain of the enamel than a deposition of calculus matter. It is chiefly peculiar to the teeth of children and young persons, though it is sometimes met with on those of adults. It can scarcely, however, be called salivary calculus, for it does not appear to be a salivary deposit, but rather a hardening of the mucous secretions of the mouth. This supposition appears the more probable, when we consider that it is hardly ever met with, except on the anterior surfaces of the front teeth, and more frequently on those of the upper than on those of the lower jaw. From its being almost inseparably connected with the teeth, it is often exceedingly difficult of removal. It, more than any other kind of tartar, injures the enamel. It seldom fails, if permitted long to remain, to soften it and make it rough. I have often known the enamel, near the gum of the outer surface of the upper front teeth, to be entirely destroyed by it.

THE EFFECTS OF SALIVARY CALCULUS.

The teeth, and their contiguous parts, suffer more from accumulations of tartar, than from almost any other cause. Caries is not much more destructive to the teeth than large depositions of this substance. They vitiate the secretions of the mouth, render them acrid and unfit to be taken into the stomach, inflame the gum, and cause it to recede from the necks of the teeth, and impart an unhealthy action to the alveolar processes, which, in consequence, become absorbed, until,

finally, the teeth are loosened and drop out. In this manner, whole sets of teeth are frequently lost in the course of a few years.

When salivary calculus is permitted to accumulate for any great length of time, the gums become so morbidly sensitive, that a tooth-brush cannot be used, without producing great pain: consequently, the cleanliness of the mouth is not attempted, and thus, no means being taken to prevent the formation of tartar, it accumulates with increased rapidity, until the teeth, one after another, and in quick succession, fall victims to its desolating ravages.

It not only undermines, sometimes, the soundest constitutions, by occasioning discharges of fetid matter from the gums, and corrupting the juices of the mouth, but also renders the breath exceedingly unpleasant and offensive. I have known the atmosphere of a tight room to be so contaminated by a person, whose teeth were loaded with this substance, that it was next to impossible for any one to remain there.

Fungoid growths and ulcerations of the gums and different parts of the mouth, pain in the jaws and ears, neuralgia faciei, opthalmia, almost every variety of diseased antrum, and bony excrescences of the alveolar processes and maxillary bones, are occasionally produced by the formation of this matter upon the teeth. Moreover, from its unhealthy influence upon the salivary and mucous secretions of the mouth, it is indirectly a most prolific cause of caries of the teeth. Few are aware of its pernicious effects, and, when they lose the teeth by it, seem much astonished that they should be deprived of them when they are perfectly sound.

THE REMOVAL OF SALIVARY CALCULUS.

This is an operation of inestimable value to the health of the gums and all the maxillary organs. But, from a misconception of its nature, rather than from a fear of its pain, many are much opposed to it; and, notwithstanding the universal admiration excited by clean and white teeth, suffer the beauty of these organs to be destroyed, rather than submit to its performance. There are some, indeed, who, though scrupulously particular in every thing that regards dress, seem, nevertheless, to consider the cleanliness of their mouths as unworthy their notice.

The apprehensions that this operation will remove the enamel, are entirely groundless. Moreover, it is rarely or never attended with pain, and the satisfaction of a clean mouth will amply compensate for any other unpleasantness, if any there be, that attends its performance.

For the removal of calculus from the teeth, a variety of instruments are necessary, which should be so constructed, that they may easily be applied to all of the teeth to which this substance adheres. Those that are put up in small boxes and sold in the shops, are but ill suited for the purpose. Those used by experienced practitioners, are so very similar in their character, and so well known, that we do not deem it necessary to

point out the minute differences of their construction, or even to give a general description of the instruments themselves.

Every dentist should have a sufficient variety of them to enable him to perform the operation in the most perfect manner, and with the least possible inconvenience to the patient. For, if any particles of tartar be suffered to remain, they will irritate the gum, and serve as nuclei for immediate subsequent re-accumulations.

The gums not unfrequently bleed very freely during the operation: consequently, it is better to remove the tartar from the lower teeth first, else the blood will prove a source of great annoyance to the operator. When the lower front teeth have become loosened, he must proceed with much caution, and, in order to prevent the teeth from being jarred, or started from their sockets, he should steady them with the thumb or fore-finger of the left hand.

The adhesion of tartar to the teeth is sometimes so strong, that considerable force is required for its removal, even when the sharpest and best tempered instruments are employed. But ordinarily, not much, if properly applied, is requisite. Considerable tact, however, is always necessary to perform the operation in a skillful manner; more than most persons, from its simpleness, imagine. This skill can be acquired only by practice. Calculus may be taken from the outer and inner surfaces of the teeth without much difficulty, but the removing of it from between them, is more troublesome, and can only be effected by means of very thin, sharp pointed instruments.

When this substance has greatly accumulated, it should not all be taken away at one time. It should be removed first from between the edges of the gums and the roots of the teeth. Thus an opportunity will be afforded, between the respective sittings of the patient, for the gums to heal, and for any of the teeth, that are loosened, to become firm. It would also be advisable to wash the mouth, four or five times a day, with some astringent or detergent lotion, such as dilut. tinct. myrrh and nut galls. More particular directions on this subject will be given, when we come to treat of the diseases of the gums and alveolar processes.

There is a means, that is frequently resorted to for the removal of tartar, which I cannot suffer to pass unnoticed: I allude to the employment of solvents. Their use, it is true, has been deprecated by almost every writer on dentistry; but yet it is still continued, and that too even by some very respectable practitioners. Those that are most employed for this purpose, are such of the mineral acids as are supposed to possess the least affinity for the elementary principles of the enamel. The muriatic is probably oftener used than any of the others. We have before had occasion to notice the injurious character of these articles, in our remarks on the use of tooth powders.

The advocates of this practice suppose, that certain mineral acids, in consequence of the want of affinity that exists between them and the phosphate of lime, a principal constituent of the enamel, may be used upon the teeth with perfect impunity. But, were it not true that they act upon the teeth as solvents, they would not dissolve the tartar, which, in its composition, is very

similar to the enamel. Any chemical agent, that will decompose the one, will decompose the other also, and the use of all such should be carefully avoided.

When the gums have been restored to health by the removal of the tartar, and by other means, hereafter to be considered, its future re-accumulation may be prevented by a regular and constant use of a suitable brush.

CHAPTER XIII.

DISEASES OF THE GUMS AND ALVEOLAR PROCESSES—SPONGY AND INFLAMED GUMS, ACCOMPANIED WITH AN ABSORPTION OF THEIR EDGES AND THOSE OF THE ALVEOLAR PROCESSES—THEIR TREATMENT—PRETERNATURAL AND PRURIENT GROWTH OF THE GUMS, &c.

THE gums and alveolar processes, from apparently the same cause, frequently assume various morbid conditions. Every unhealthy action in one, is almost certain to be followed by some disorder in the other. The most common form of disease, to which these parts are subject, is usually, though very imperfectly, denominated scurvy, from its being supposed to resemble *scorbutus*, “a genus of disease in the class *cachexiæ*, and order *impetiginis* of Cullen. To this disease, however, it bears no resemblance. Instead, therefore, of continuing the use of this term, I propose to treat of it under the appellation of *spongy and inflamed gums, accompanied by an absorption of their edges, and those of the alveolar processes*, which seems to me to express more clearly the condition of the parts, and the nature of the

affection. The other disorders, to which the gums and alveoli, are liable, will be noticed under appropriate heads.

The diseases of the gums and alveolar processes are divided, by Mr. Bell, into two classes; "those which are the result of local irritation, and those which arise from constitutional causes."*

But were it not for local irritation, the constitutional tendencies to disease, in these parts, would rarely manifest themselves; and, on the other hand, were it not for constitutional tendencies, the effects of local irritation would seldom be of a serious character. "Thus," says Mr. B. "the same cause of irritation, which, in a healthy person, would occasion only simple abscess, might, in a different constitution, result in ulceration of a decidedly cancerous type; and, in others, in the production of fungoid tumors, or the formation of scrofulous abscesses."†

SPONGY AND INFLAMED GUMS, ACCOMPANIED BY AN ABSORPTION OF THEIR EDGES, AND THOSE OF THE ALVEOLAR PROCESSES.

The gums, when affected with this disease, are turgid and spongy, have a dark florid or purple appearance, their edges are thick and round, and, on being pressed, discharge matter, varying from healthy pus to that of the most fetid kind. They are sometimes

*Bell on the Teeth, p. 207.

†Anat. Phys. and Diseases of the Teeth, p. 207.

slightly painful, usually very sensitive, and bleed from the most trifling injury.

The disease generally first makes its appearance round the lower front teeth and the upper molares, opposite the mouths of the salivary ducts, and in the immediate vicinity of aching, decayed, dead, loose, or irregularly arranged teeth, or in the neighborhood of roots, whence it extends to the other teeth. The rapidity of its progress is dependent on the age, health, and constitutional temperament of the individual, and the local irritants that excite and keep up its action. In some cases, it exists for years, without occasioning any perceptible loss of the substance of the gums, or alveolar processes; the only apparent unpleasant consequences attending it, being a vitiated state of the secretions of the mouth, and an offensive breath. In other instances, it progresses so rapidly, that, in a few weeks or months after its first appearance, both the gums and alveoli become involved in complicated disease.

When the inflammation set up in the gums is favored by a constitutional tendency, it soon extends to the alveolar and dental periosteums, and causes a deposition of bony matter at the bottom of the socket. The edges of the gums and alveolar processes are, at the same time, being absorbed, so that, finally, the teeth, by the destruction of the parts that contain them, are loosened and drop out.

Nor do the pernicious effects of this disease always stop here. Constitutional symptoms often supervene, more vital organs become implicated, and the health of the general system is sometimes very seriously impaired. Hence, the constitutional improvement that is

often seen, after the loss of the teeth of those persons, whose mouths were previously affected with this disorder. In the preceding parts of this work, we had frequent occasion to allude to the effects of diseased teeth, gums, &c. on the economy, and also to point out the vast importance of the food being properly masticated and mixed with a pure saliva; it will now therefore, only be necessary for us to observe, that no condition to which the mouth is liable, has a greater tendency to deteriorate its secretions, and impair the functions of mastication, than the one now under consideration.

In forming an opinion of its character, and the consequences that are likely to result from it, we must be governed, not only by the health and age of the patient, and the local causes concerned in its production, but we should also endeavor to ascertain, whether it is connected with a constitutional tendency, or is purely a local disease. To determine these points, will often require much pathological knowledge, because its causes are frequently involved in much obscurity. Hence some have been led to believe, that the wasting away of the gums and alveolar processes, may sometimes take place without being connected with any special local or constitutional causes; that it is identical with that process by which the teeth of aged persons are removed and that when it occurs in persons not past the meridian of life, it is symptomatic of a sort of premature old age.

Mr. Bell, on this subject, remarks: "In forming a judgment upon cases of this description, however, and even on those, in which the loss of substance is associated with more or less of diseased action, it is neces-

sary to recollect, that the teeth are generally removed in old age by this identical mode, namely, the destruction of their support, by the absorption of the gums and alveolar processes; and as this step towards general decay commences at very different periods in different constitutions, it may doubtless, in many cases, even in persons not past the middle period of life, be considered as an indication of a sort of premature old age, or an anticipation, at least, of senile decay, as far as regards these parts of the body.”*

Though the loss of the teeth, by the absorption of the gums and alveolar processes, is almost always an attendant on advanced age, yet I do not believe it to be a necessary consequence of senility, for we occasionally see persons of seventy, and even eighty years of age, whose teeth are as firmly fixed in their sockets, and their gums as little impaired, as they were at twenty. I do not recollect ever to have seen a case of this sort of absorption, in which there was not evidently some diseased action in the parts. It is of but little importance to our supposition, provided this action exists, whether it be the result of a constitutional tendency, a functional disarrangement of some other parts, or of a local irritation.

I am, however, led to believe that, no matter how great soever may be the constitutional tendency to the disease, it would never manifest itself were it not for some cause of local irritation. This belief seems to be justified by every circumstance connected with the early stages of the disease. It is not necessary that

* Bell on the Teeth, p. 210.

there should be aching, decayed, dead, or irregularly arranged teeth, or tartar, to irritate the gums and alveolar membrane. The arrangement of the teeth is often such, even when regular, that inflammation is produced in certain parts of the mouth, which, sooner or later, according to the particular constitutional temperament, results in disease. Hence it is, that in mouths where all the teeth are sound, we occasionally see a gradual wasting away of such parts of the gum as are most prominent, especially those parts of it which surround the cuspidati and the palatine fangs of the upper molar teeth.

The secretions of the mouth, especially the mucous, are often rendered, by certain conditions of the general system, so acrid, that they become a source of great irritation to the gums. And it may be that all the teeth, as their vital powers are weakened by age, are, to a certain extent, obnoxious to the more highly organized and sensitive parts within which their roots are contained.

Thus, it will be seen, that local agents may exert a considerable influence in the production of this disease, without their being easily detected. It should also be recollected, that a person of sixty, seventy, or even eighty years of age, is exposed to the same, and perhaps more powerful local causes of it, than one of twenty, and that the reason their effects are not always soon developed, is, that there are greater tendencies to this disease in the constitutions of some than in those of others.

Mr. Koecker,* a practitioner, who has had the finest

* Koecker on the Teeth, p. p. 282, 283.

opportunities of observing this affection in all its various forms, says, he has never seen a case of it, in which tartar was not present.

This disease attacks persons of all ages, ranks, and conditions, and in every country, climate, and nation. "I have observed," says Mr. Koecker, "the inhabitants of the most opposite countries, the Russians, the French, the Italians, the Spaniards, the Portuguese, the English, the Africans, the East and West Indians, and those of the United States, to be all more or less liable to it."*

It is, however, more frequently met with in the lower than in the higher classes of society. Persons, who pay no attention to the cleanliness and health of their teeth, are particularly subject to it. With sailors, and those who live principally on salt provisions, it is very prevalent. "Persons, of robust constitutions, are much more liable to this affection of the gums, than those of delicate habits; and it shows itself, in its worst forms, oftener after the age of thirty than at any earlier period."†

Every thing that tends to produce inflammation in the gums and alveolar processes, may be regarded as exciting causes of this disease. To those that have been already enumerated, may be added, accumulations of extraneous matter on the teeth, and along the edges of the gums, exostosis of the roots of the teeth, artificial teeth badly inserted, or of improper materials, and dental operations injudiciously performed. The use of tooth-brushes, wrongly constructed, and improper tooth pow-

* Koecker on the Teeth, p. 273.

† Ibid, p. 272.

ders, especially charcoal, are usually reckoned among its exciting causes. Acids of all sorts, we are told by Dr. Fitch, produce "irritability of the gums about the necks of the teeth."*

Every condition of the general system, that tends to increase the susceptibility of the gums to the action of local irritants, favors the production of this disease; and every thing that tends to induce such conditions, may be regarded as its predisposing causes; such are bilious and inflammatory fevers, the excessive use of mercurial medicines, venereal poison, and intemperance and debauchery. Any deterioration of the fluids of the body is peculiarly conducive to it. Persons of cachetic dispositions are far more subject to it, and generally in its worst forms, than those in whom no such tendencies exist.

Persons of strumous habits, sometimes have an affection, which, though it may be thought somewhat to resemble the one just described, yet differs from it in many respects. The gums, instead of being purple and swollen, are paler and harder than ordinary, and, on being pressed, discharge a muco-purulent matter, of a dingy white color. They often remain in this condition for years, without appearing to suffer any loss of substance from absorption, or to affect the alveolar processes.

This variety of disease of the gums, is principally confined to persons that have very white teeth, is much less likely to attack males than females; and has never, so far as I have been able to ascertain, been mentioned

* Dental Surgery, part I, p. 205.

by any dental writer. Mr. Fox speaks of ulceration of the gums of scrofulous children; but that is of frequent occurrence, and is characterized by the usual signs of inflammation. This rarely occurs before the age of eighteen or twenty; and, though unquestionably the result of inflammation, yet the gums exhibit no inflammatory symptoms; but, on the contrary, are paler, less sensible, and possessed of less warmth than usual. It is never attended with tumefaction of the gums, and by absorption only in its advanced stages; whereas, the affection, of which Mr. Fox speaks, is always accompanied by both.

Its effects are the most simple and innocent of any form of disease to which the gums are liable; but its cure is generally the most difficult.

TREATMENT OF SPONGY AND INFLAMED GUMS, &c.

Spongy and inflamed gums are generally regarded by dentists as being capable of cure, and, so far as regards their restoration to health, they most assuredly are; but when they have lost their connection with the teeth, a re-union can never be established.

The gums, after having been once affected in this manner, are very liable to be attacked again, because the necks of the teeth, having become exposed, present a surface more favorable to the collection of tartar, and more irritating to the edges of the gums, than the crowns previously had been.

The treatment of spongy and inflamed gums, in order to be successful, must be thorough. No temporizing, half-way measures will answer. If an energetic

and properly conducted plan be pursued, a favorable result may always be anticipated.

Local irritation being the cause of this affection, its curative indications are obvious. All dead and loose teeth should be extracted, salivary calculus and every other sort of offensive irritating matter should be taken away; "all such teeth," says Mr. Koecker, "as, from their irregular situation or direction, excite a mechanical irritation, provided this irregularity cannot be remedied by filing, or by cutting away the irritating parts, should also be removed."

Irregularity of the teeth is so productive of irritation to the gums and alveolar membranes, that the gums are seldom healthy, whenever it is at all considerable; but, instead of first attempting to remedy the evil, in the manner recommended by Mr. Koecker, we should at once remove the cause, by extracting one or two teeth, provided their removal will not injure the appearance of the denture.* The irritation occasioned by the pressure of the incisors, may, in young persons, generally be allayed by the extraction of a bicuspid, on each side of the mouth; but the propriety of the operation can never be ascertained, except by a judicious examination of each individual case. "A molar tooth, that has no antagonist, should not," says Mr. Koecker, "be permitted to remain, particularly if it be situated in the upper jaw." This opinion is certainly in accordance with the indications of nature; for when a tooth has been deprived of its antagonists, it commonly soon becomes protruded by the filling up of the bottom of its socket with

*Vide *Method of Directing Second Dentition*, in a preceding part of this work.

a bony deposite, the gum around it usually soon inflames, and it is more sensitive than the other teeth.

“In this manner,” says the author just quoted, “the loss of one molar tooth, produces the destruction of its remaining antagonist. This is effected, however, after a struggle of nature, of very long duration, which will always involve, in some degree, all the other teeth in a like diseased condition; it is necessary, therefore, to prevent this morbid condition, particularly pernicious in this disease, by the extraction of the tooth, or any molar so situated.”

Although a molar tooth, after having lost its antagonist, is generally productive of bad consequences, it may sometimes be allowed to remain with impunity. Their removal is necessary only when they act as irritants to the gums.

To the cure of this disease, it is essential that a decided impression should be made upon it, at once; consequently no time should be lost in the removal of its exciting causes. If there be any teeth which act as irritants, and cannot be restored to health, they should be removed at one sitting. The advantage derived, in this disease, from this operation, says a distinguished practitioner, would be either partly or wholly lost, were it performed at different periods. This observation has been verified by me more than once. When I have been prevented by the timidity of my patient from extracting all the offending teeth, at the first sitting, I have always found the cure much retarded, and in some instances, almost entirely defeated.

This operation having been completed, Mr. Koecker thinks that we had better wait ten or fifteen days, be-

fore we remove the tartar. Dr. Fitch, however, is of the opinion, that "extraction should precede all other operations, though, in some cases, all may be performed the same day." The operations of extraction and cleansing, should, for reasons before stated, be performed with as little delay as possible; but it is of no great consequence which be performed first; though, on some accounts, it is desirable, that so much of the tartar as can, should be removed at one and the first sitting. Several sittings, however, as has been before remarked, are often requisite for its complete removal.

The bleeding from the gums and sockets, occasioned by these several operations, should be promoted by frequently washing the mouth with warm water; and when the gums are much swollen, they should be, from time to time, freely scarrified with a sharp lancet. This operation is highly recommended by Messrs. Hunter, Fox, and Bell, and indeed its good effects are so apparent, that it should never be neglected. The application of leeches to the gums, is also attended with the most decided advantage. For the last four or five years, I have been accustomed, in obstinate cases, to recommend their employment, and the decided improvement of the gums that have followed their use, has sometimes been truly astonishing.

After the gums have begun to recover, amendment will be much accelerated, by washing the mouth several times a day, with some tonic and astringent lotion. The following I have found to be very serviceable.

℞ Pul. nut galls, ʒ ij
 Orris root, ʒ i
 Cort. cinchonæ, ʒ ij
 Infus. rosæ, ʒ iv. *Misce.*

Mr. Fox says, that great benefit is derived from the use of sea water, "and therefore," says he, "I always recommend it whenever it can be procured;" adding, that if the gums be tender, it should be used warm. I am unable to speak of its merits, from experience; but I should suppose, that no decided advantage could result from its use. I have, in cases where there was much soreness and ulceration of the gums, prescribed the following:

℞ Sub. boras-soda, ʒ ij
 Decoct. sage, ʒ vj
 Honey, ʒ i *Misce.*

As a wash for the mouth, Dr. Fitch recommends a decoction of the inner bark of green white oak, which I have, in several cases, prescribed, and always found it to be beneficial. The following are recommended by Mr. Koecker, as being very serviceable:

"Take of clarified honey three ounces, and of vinegar, one ounce. This, diluted in the proportion of three table spoonfuls to a pint of warm sage tea, or water, may be used frequently during the day.

"Take of clarified honey, and of the tincture of bark, two ounces each. Mix and dilute as above.

"Take of honey and of the tincture of myrrh, two ounces each. Mix and use as above.

"Take of honey, and of the tincture of rhatania, two ounces each. Mix and dilute as above.

"Take of honey, and of the tincture of catechu, one ounce each. Mix and dilute as above."

Mr. Koecker judiciously directs that the mouth, after the extraction of the teeth, should be frequently washed

for several days, with one of the foregoing preparations. Mr. Bell recommends the following:

℞ Aluminæ, ʒ ij
 Decoct. cinchonæ.
 Infus. rosæ ā ʒ ij *Misce.* Fiat lotio.

If, notwithstanding the use of the means which we have here recommended, matter still be discharged from around the necks of the teeth, and the gums continue spongy, and manifest no disposition to heal, their edges should be touched with a solution of the *nitratum argentum*, which will seldom fail to give to them a new and healthy action. It may be used in the proportion of one or one and a half drachms, to one ounce of water. The most convenient mode of applying it, is with a camel's-hair pencil. Its use is recommended by Mr. Fox, and will often succeed, when all other remedies fail. In those cases where the matter discharged from the edges of the gums has a nauseating and disagreeable odor, "a weak solution," says he, "is an excellent remedy for rendering the mouth sweet and comfortable;" but in using it in this way, precaution is necessary to prevent its getting in the fauces, as, in that case, it will cause a disagreeable nausea.

While the means here directed for the cure of this disease, are being employed, a recurrence of its exciting causes must be studiously guarded against. Tartar and foreign matter of every kind, must be prevented from accumulating on the teeth, by a free and frequent use of a suitable brush, which, until a healthy action be imparted to the gums, should be used at least five times a day; as, for instance, immediately after rising in the morning, immediately after every meal, and before

retiring at night. The application of the brush may at first occasion some pain; but its use should, nevertheless, be persisted in; for, without it, all the other remedies will be but of little avail. The friction produced by it, besides keeping the teeth clean, is of great service to the gums; as it imparts to them a healthy action.

A treatment different from that here described, is necessary for the form of disease, which we noticed, as being characterized by a preternatural paleness of the gums, and by a discharge of muco-purulent matter, from between their edges and the necks of the teeth. In the first case of this disease, that I treated, I directed astringent and detergent lotions to be used; but these did not produce the desired effect. Having been led from my observations on this case, to believe that the disease was connected with the constitutional health, and probably the result of a debilitated state of the general system, I recommended, in the next case, in which I was consulted, the use of tonics and free exercise in the open air. This course, though attended with an evident improvement of the general health, seemed to be productive of no benefit to the gums. They still appeared debilitated, and, on being pressed, discharged matter from beneath their edges. I advised a continuance of the tonics and exercise, and with a view of exciting inflammation, touched the edges of the gums with *nitratum argentum*. This had the desired effect, and, as I had anticipated, a new disease was substituted for the old one; for the cure of which, I directed the mouth to be washed, five or six times a day, with sage tea, slightly impregnated with alum, and sweetened with honey; and every night and morning, with

warm salt water; which, as soon as the tenderness of the gums subsided, was used cold.

This treatment was perfectly successful. In about three weeks the gums assumed a healthy action, acquired their natural color, and the discharge of mucopurulent matter entirely ceased. I have since had occasion to treat several other cases of the same disease, in all of which I adopted a similar practice, and with a like success.

PRETERNATURAL PRURIENT GROWTH OF THE GUMS.

Though this disease, in very many respects, resembles the preceding, yet it has many peculiarities, which are worthy of separate consideration. It is characterized by swelling and inflammation of the gums; but instead of causing them to retire from the necks of the teeth, it occasions a morbid growth of their substance; so that in some instances the crowns of the teeth, are entirely covered, and mastication rendered exceedingly difficult and painful. The gums, when affected with this disease, as when affected with the other, are of a dark purple color, with thick, smooth, rounded edges, and discharge a very fetid matter. They hang loosely around the teeth, and are attended with a peculiar itching sensation, which, at times, is very annoying; they are also so very sensitive, that even the pressure of the lips produces pain. Their vessels are turgid, and often bleed profusely from the slightest touch.

The breath of a person thus affected, is exceedingly offensive, his saliva is vitiated and so viscid, that it is often difficult for him to spit. The secretions of the

mouth generally are so acrid, that gold, even twenty carats fine, is readily corroded by them.

This peculiar affection, though perhaps excited into action by local irritants, yet appears to be dependent on a cachectic tendency of the constitution. How far it may be influenced by local causes, I am unable to determine. It often attacks the gums of individuals, whose teeth are perfectly sound, and regular in their arrangement; but I have never seen a case of it, where tartar was not present, though, in some instances, in so small quantities, that I doubted whether it could have had any agency in the production of the disease. A diseased action, however, may have been first excited in the gums, by its presence, which, afterwards, having been favored by a constitutional predisposition, may have continued until it threw the gums into the condition which we have just described.

TREATMENT OF PRETERNATURAL PRURIENT GROWTH OF THE GUMS.

The first thing to be attended to in the treatment of this disease, is the removal of all dead and such other teeth, as may, from any cause, irritate the gums. The affected part of the gum should be next removed, by making a horizontal incision entirely through to the crowns of the teeth. This should extend as far as the morbid growth itself extends, even if that be around the whole circle. After this operation has been performed, the gums should be freely scarified, by passing

a lancet between each of the teeth entirely down to the alveolar process, in order that the vessels may discharge their accumulated blood. This should be repeated several times, and at intervals of four or five days. Meanwhile the mouth should be washed several times a day, with some astringent and detergent lotion; and occasionally with a weak solution of nitratum argentum. The tartar also should be removed, as soon as the gums have sufficiently collapsed.

During the employment of these local means, the constitutional health should not be neglected; but such remedies prescribed, as shall be best calculated to counteract and break down every tendency to the disease. Particular attention must be paid to regimen, and excesses, and intemperance of every kind, prohibited. Suitable exercise, and vegetable diet, should be prescribed. If any animal food be used, it should be fresh, and consist principally of beef, mutton, and fowls. Vegetables, especially fruits, and acid beverages, such as spruce beer, lime juice, and infusions of malt and vinegar, are recommended to persons of cachectic habits, because they restore to the fluids, the healthy qualities of which they have been deprived.

I have met with several cases of this description of diseased gums, which, when treated as here recommended, were uniformly restored to health; so that I do not hesitate to say, that most of the failures, which occur in the treatment of this, as well as every other sort of spongy and inflamed gums, is attributable to a hesitating, timid, and inefficient course of treatment. If a prompt and thorough course, upon the principles

here laid down, be pursued, success will surely follow. This I say, because I have seen these affections of the gums in their worst forms, and in every stage, and have never known them fail of being cured, when they were properly treated.

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CHAPTER XIV.

TUMORS AND EXCRESCENCES OF THE GUMS AND
ALVEOLAR PROCESSES.

FROM the gums and alveolar processes, tumors and excrescences, of various kinds, occasionally arise, which vary in their character, from a mere simple growth of the gums, to those of a fungoid, cartilaginous, bony and scirrhus nature. We shall leave it to the general surgeon, to treat minutely of the many varieties, which this description of disease occasionally presents, and shall content ourselves with giving a brief view of some of its peculiarities, and a few observations on the causes most frequently concerned in its production.

Tumors and excrescences of these parts, are very variable in their character and appearance. The surface of some is smooth; that of others is rough, and sometimes covered with eroding ulcers: some are bulbous, and have a broad base; others are attached to the gums by a mere peduncle: some are soft, others are hard; the growth of some is astonishingly rapid; that of others is so slow, as to be scarcely perceptible: some are

almost entirely destitute of blood vessels; others appear to be almost wholly composed of sanquiferous capillaries: some are nearly destitute of sensibility; others are so exquisitely sensitive, that the slightest touch produces the greatest pain, whence they have been named, *noli me tangere*: some are nearly white, others have a grayish appearance; some retain the color of the natural gum; others are of a dark purple hue: finally, some exist for years, without being attended with any very serious consequences; while others, in a very short time, bring on a general constitutional derangement.

These tumors seldom arise spontaneously, but are, in most instances, the result of local irritation, occasioned by the presence of tartar, decayed, or dead teeth, and roots. Their character is doubtless determined by the degree of excitability that exists in the gums, and by the constitutional tendency of the general system. Hence their great variety. Different effects are often produced by the same causes; and a cause that would, in a person of a healthy and sound constitution, produce a tumor or excrescence of the most simple kind, might, in another, laboring under some unhealthy excitement, or of a strumous, cachectic, or some other peculiar habit, occasion a tumor of a fungoid, cartilaginous, bony, or scirrhus character.

It is perhaps quite probable, that these tumors sometimes appear independent of any local cause; yet I think that their origin is more frequently local than is generally supposed; and that, if all the circumstances connected with the history of each case, especially the previous condition of the teeth, could be accurately ascertained, their cause might, in most instances, be traced

to irritation of the gums, or alveolar membranes, produced by some unhealthy or crowded state of these organs, or to salivary calculus.

Liston, in his practical surgery, remarks: "Very many of the *tumors of the jaws*, are traceable to faulty growth or position of the teeth, to diseases of their bodies, or to improperly conducted operations upon them." And, in speaking of tumors of the gums, he observes: "They are caused by decay of some part of one or more teeth, of the crown, neck, fang, or they may arise from their being crowded or misplaced."* The pressure of the teeth on certain parts of the gums, and membranes of the alveoli, which irregularity necessarily occasions, keeps up a constant irritation; and it thus as frequently gives rise to these tumors, as does the presence of tartar or decay.

We do not, however, conceive it necessary to the production of these tumors, that any of the causes here enumerated should exist at the time they make their first appearance. The gums and alveoli, having been once affected, are ever afterwards more susceptible to morbid impressions. It is, therefore, quite probable that an unhealthy action, is sometimes continued in them, long after the cause that produced it, ceases to exist; and that this, from its being favored by a subsequent unhealthy action of some other part, or of the system generally, occasions and determines their location in those parts. When we consider how often and almost constantly the gums and alveolar periosteums, are exposed to irritation, from the causes just mentioned, we can-

* American Medical Library and Intelligencer, vol. xi, No. 9, 1838, p. 206.

not fail to admit, that the hypothesis is, at least, supported by a great degree of probability. No one, I think, will pretend to deny that the maxillæ and gums, suffer more from local irritation, than any of the other parts of the body; and to this irritation, I am firmly persuaded most of their diseases are to be ascribed.

Of these kinds of productions, the most common is that which, in its structure, resembles the gum, except that it is usually rather more vascular. This description of tumor is always occasioned by carious teeth, or the roots of those that have decayed; and on their removal generally spontaneously disappear. But if this should not be the case, they should be excised. To this, however, I have rarely had occasion to resort.

About three years ago, I was called on, by a gentleman who had a considerable enlargement of the gum, that had followed an attempt to extract the first superior molaris of the left side, in which the two outer fangs had been fractured from the crown, and left in their sockets. For fifteen or twenty days after the operation, he informed me he had experienced considerable pain, but that at the expiration of this period, it had entirely subsided. About two months after, however, it again was experienced, although the roots were entirely covered with the gum, which was much inflamed, and soon began to assume a bulbous form, and gradually to increase in size, until it had, at the time I saw him, twelve months after the operation, attained the size of a black walnut.

The tumor being situated over the remaining roots of the tooth, I advised him to have it removed, and the roots then extracted. But although he readily agreed

to the removal of the roots, he could not be brought to consent to the excision of the tumor. In extracting the roots, however, it was necessary to cut away about a third of its base; and in six or eight days after, all the remainder sloughed off, and the gum soon assumed a healthy appearance.

Mr. Fox relates a case of a lady, who had an enlargement of the gum, that almost entirely filled up one side of her mouth. She first applied to Sir Astley Cooper, who, sent her to Mr. Fox, to have several decayed roots, that were around the tumor, extracted, before he should attempt its extirpation. The fangs being imbedded in the gums, the excrescence was much lacerated in their removal, afterwards it became placid, assumed a dark color, and in a short time sloughed off. Thus a perfect cure was effected without any other operation, than that of the extraction of the decayed roots.*

This tumor, it would seem, partook somewhat of a fungoid character, and those of this description are generally much more difficult to cure, than those which consist of a mere simple growth of the gum, like the one first noticed. Although they sometimes thus spontaneously disappear, on the removal of the causes that produced them, yet in most cases, extirpation becomes necessary, and even this, when not performed in the most perfect manner, is not always effectual. After the removal of one, another, has sometimes been known to spring up in its place; and thus several have sometimes appeared in immediate succession.

Mr. Hunter attributes the disposition of a tissue to

* Diseases of the Gums, p. 84.

reproduce excrescences of this kind, to a scirrhus tendency of the parts from which they originate. However that may be, a tumor will rarely reappear, if the diseased structure be completely removed.

Mr. Fox recommends that excrescences of this sort should be extirpated by means of a ligature, and informs us that when they are thus removed a second operation is seldom necessary. Excision is often attended with a profuse and obstinate hemorrhage, and on this account, the operation recommended by Mr. F. should always be preferred, whenever its performance, is at all practicable. The basis of some tumors, are, however, so broad, that a ligature cannot be applied sufficiently low, to include their whole structure. In such cases we must resort to excision and if the hemorrhage cannot be stopped by compress, the actual cautery should be employed.

Mr. Hunter, in treating of morbid growths, of soft parts, observes. "Arteries going to increased parts are themselves increased and have not the contractile power of a sound artery;" hence, when wounded, they bleed more freely than those that are in a healthy state.

The removal of these excrescences by means of a ligature, being not attended with so much hemorrhage, and also usually exterminating them more effectually than excision, determined Mr. Fox in his choice of this mode of extirpation. In treating of this subject, he remarks: "I determined some years since, that if any case of this kind should ever come under my care, I would attempt their removal by means of ligatures. The first case in which I was consulted, was a lady of about forty years of age, who had several of the teeth on the right

side of the upper jaw extracted when she was a young woman; about five years before I saw her, the gums covering the jaw where the teeth had been situated, appeared to be thicker than before; they gradually increased in size until a very large tumor was formed; it had now become so large as to affect the speech, and in other respects was extremely troublesome.

“The lady was very desirous to have it removed; to effect which without incurring the danger of hemorrhage, I employed ligatures, close to the jaw-bone, through the substance of the tumor, half of which was then included in each ligature. The ligatures were tied just tight enough to stop the circulation; the next day there was a great deal of inflammation, which subsided in proportion as the ligature began to produce ulceration, which on the fourth day was very considerable; new ligatures were then applied; on the sixth day these were removed and others introduced; on the eighth, one ligature came away, leaving the tumor hanging only by a small peduncle; this being cut through with a lancet the whole was removed.”*

Even if the base be large, the plan, above detailed by Mr. Fox, of passing a needle, armed with a double ligature, through it close to the bone, will, in most instances, insure success. The ligatures should be tied sufficiently tight to cut off the circulation between the tumor and the general system, and should be reapplied as often as they come away, until the tumor be entirely sloughed off, when the place should be touched with diluted nitrous acid or with a solution of *argentum nitratum*.

* Fox on the Teeth, part ii, p. 85, 86.

Cartilaginous excrescences of the gums and alveolar processes are of a comparatively rare occurrence, but when they do happen, they are much more difficult to remove than fungi, or those which consist merely of a preternatural growth of the gum. The hardness of their substance is such, that, in many cases; their removal by ligatures, is impracticable, and their extirpation with the knife, is also sometimes exceedingly difficult and tedious. The same objections apply to their removal by means of the knife as exist to that of fungoid tumors, for, though their substance is of a cartilaginous nature, they at the same time, partake more or less of a fungoid character. The knife, however, is in many cases, the only means by which their extirpation can be effected.

Ambrose Parè, with no small self gratulation, talks of having removed them, when they were so large that they came out of the mouth, giving a most hideous appearance to the face, and when no other surgeon dared to undertake their cure, because of the lividity of their color. "This lividity," says he, "I did not fear, but I had the boldness to cut and even to cauterize the tumors until the disease was entirely cured."*

Jourdain in speaking of cartilaginous excrescences, remarks: "About thirty-six years ago, I was called with Allertius Baringue, surgeon, to see a woman that had a tumor of a large size situated on the gum of the molar teeth. It occasioned her mouth to be drawn to the opposite side of her face when she was seized with spasms. We advised her not to delay too long in having it removed; to this she would not consent, but in a

* Liv. viii, chap. 1 v. p. 188.

short time finding that the excrescences increased so fast, and in such a manner, that it hindered her from taking food, she changed her mind. The tumor was embraced with a brass wire, which we tightened every day. The excrescence, receiving nothing now to augment its growth, fell, and upon examination, we found that it was altogether cartilaginous.”*

Dr. Fitch quotes a case from Luzitanus, in which the operation for the removal of the tumor was followed by a fatal hemorrhage. The tumor is described as being about half the size of a hen's egg, exhaling a fetid odor, and being very painful. He also mentions a case of a somewhat similar character that came under his own observation. “The tumor occupied the space of the four incisor teeth of the upper jaw. The teeth were all carious. I extracted them. The tumor had four fistulous openings which ran in the direction of each tooth, and which furnished to each a fetid humor. With the actual cautery well heated in fire and double edged, I made but one wound of the four fistulous openings; I touched the bone that was carious, which was repeated several times in the space of three months. In proportion as the exfoliations were made, the tumor diminished. The patient was cured near the end of the fourth month.”†

When the base of the tumor is very broad and the bone beneath carious, as in the case described by Dr. Fitch, the actual cautery is without doubt the surest remedy; because it is obvious that until the diseased bone is exfoliated a cure can never be effected. But

* Jourdain, vol. 2, p. 334.

† Fitch's Dental Surgery, p. 237.

under no other circumstances would I recommend it to be used.

In April, 1832, at the instance of a medical practitioner, I was requested to visit a lady of about thirty years of age, who was the subject of a cartilaginous tumor, situated on the left side of the lower jaw, on the outer and superior edge of the bone, and between the second bicuspid and dentes sapientiæ; the first and second molares having been extracted three years before. The tumor was about three quarters of an inch in length and in its shape somewhat resembled a ground or pea nut. I excised it, but with much difficulty, owing to its extreme hardness. In a short time, the wound granulated and healed, except a small portion of it, on the upper and outer surface of the bone nearly over the place that the second molaris had filled. The gum here soon began to be prominent, which led me to fear a reproduction of the tumor. To prevent this, I applied caustic, but without any beneficial result. Suspecting that the tooth might have been fractured in the operation for its extraction and a root left in the socket, I laid the gum open down to the bone. My conjectures were then realised. I found about two-thirds of one of the outer fangs of the second molaris remaining; I removed it immediately and the wound healed in twelve or fifteen days, without occasioning any farther inconvenience.

This tumor had never caused much pain. It was covered with an apparently healthy integument, but internally it was hard and cartilaginous. The hemorrhage, occasioned by the operation, was considerable, but was easily suppressed.

Tumors that originate in the alveolar processes, and in their periosteums, are generally of an osteo-sarcomatous, or cartilaginous character. The following is the only case of the kind that has ever come under my own personal observation. The subject of it was a gentleman of between thirty-five and forty years of age. It was about the size of a partridge-egg, and attached to the outer wall of the alveolus of the second superior right molaris, by a base not larger than a five cent piece. On the back part of the tumor, there was a small fistulous opening, from which an ichorous and fetid humor was discharged. The second molaris was much decayed, and on its being removed, two of its fangs were found slightly enlarged by exostosis. Having made a circular incision around the tumor, extending to the bone, I attempted to remove it with a knife; but was prevented from doing so by its great hardness. The character of the excrescence was now ascertained. I accordingly cut through the alveolar wall on each side of it, and then, by means of excising forceps, removed it, together with the alveolar paries to which it was attached. On examination, it was found to consist of cartilage, interspersed with small patches of bone.

Mr. Bell has given two cases of a very similar character. One of them, however, he says, had no connection with the alveolar processes, and the other succeeded to an attack of the tooth-ache, which had lasted several months.

A case of an osteo-sarcomatous tumor, occasioned by diseased teeth, is recorded by Bordénave. Sir Astley Cooper gives the history of two cases of a like na-

ture. In one of them the tumor originated in the alveolar cavities, and as it increased, displaced the teeth; the other case, he informs us, was produced by diseased teeth. Dr. Gibson also mentions a case of an osteosarcomatous tumor, which, "according to the patient's account, first appeared seven months before," (the time he first saw her,) "in the form of a small lump, seated in the gum above the canine tooth."

In the treatment of tumors originating from the gums, or alveolar processes, or from both, much depends on their character, and the constitutional symptoms accompanying them. Some may be entirely removed, as we before stated, by simply extracting a decayed tooth or root; others will require extirpation, and in some instances even that will not avail. In short, the treatment should be varied to suit the respective circumstances of the case.

It sometimes happens, when an operation has been performed successfully, so far as regards the local disease, that the lungs, or some other vital organ, become affected. To prevent an occurrence of this kind, it is often necessary to get up, by means of a seton, an artificial excitement in some neighboring part. Without some such precaution, the life of the patient might often be put in as great a danger as that from which it has just escaped by the removal of the local disease.

On the extirpation of fungous exostosis or osteosarcoma, Sir Astley Cooper observes: "The operation, after constitutional means have been employed, and the continuance of these means after the operation, hold out the chief hope of safety; for amputation without

these, will do no more than avert the blow for a season."

The same remarks will be found applicable to the treatment of this description of disease, in whatever part of the body it may be situated. The constitutional symptoms should never be disregarded.

CHAPTER XV.

ALVEOLAR ABSCESS—*Gum-Bile*.

THIS disease has been usually designated by the appellation of gum-bile—a name that by no means conveys a correct idea of its character; for by it, the gums are, as Mr. Bell remarks, “only secondarily affected,” while the cause, “is invariably seated within the alveolus.” Hence he adopts the more appropriate appellation of *alveolar abscess*.

This is one of the most common affections to which the alveolar cavities are liable. When it attacks one of them, it generally does not cease its ravages, until it has occasioned its destruction, and also the death of the tooth contained within it.

In its first stage, the disease is attended with a deep-seated, throbbing, and painful sensation, which, sometimes, is almost excruciating, and continues, with only occasional slight intermissions, until matter is formed, when it, in a great degree, subsides, and is succeeded by slight paroxysms of heat and cold.

Alveolar abscess, whatever may have been its remote cause, results immediately from an inflammation of the lining and investing membranes of a tooth, or from inflammation of the alveolar periosteum.

One of the effects produced by inflammation of the periosteum of the root, or of that of the alveolar cavity, is an effusion of coagulable lymph, which soon becomes hardened, and attaches itself around the root, near its apex. In this manner a sac is formed, which, as suppuration continues, distends and presses against the walls of the encompassing alveolus, and causes them to be absorbed, until an opening is made through one of them to the gum, which, in its turn, is also absorbed, and a passage effected for the escape of the matter. This opening is sometimes through the cheek or face; sometimes through the roof of the mouth, but most commonly through the gum internally into the mouth. In some instances, however, the matter, instead of discharging itself directly through the affected alveolus, has been known to pass along the jaw-bone for a considerable distance, divesting it of its periosteum and causing portions of it to exfoliate. It has sometimes traversed the very substance of the bone itself between its external and internal plates, throughout the whole length of one of its sides. Cases of this kind, however, seldom occur, but when they do, they are generally followed by very serious consequences.

The formation of an abscess in the alveolus of a *dens sapientiæ* of the lower jaw, is not unfrequently accompanied with inflammation and swelling of the tonsil glands, so as almost entirely to prevent deglutition. The inflammation sometimes has extended to the muscles

of the cheeks and eyes, and has made those of the jaw so rigid, that the mouth could not be opened.

After an abscess has once been formed, it rarely happens, that the integrity of the parts is so perfectly restored, as to prevent an almost constant liability of a recurrence of the disease. Even supposing that the opening through the socket and gum, to close, and the formation of matter to cease, yet the tooth, being deprived of vitality, is a continual source of an irritation to the alveolus and its contiguous parts, which, as has been before shown, will, sooner or later, eventuate in its loss.

The effects of alveolar abscess being such as have been here described, we should endeavor, by every possible means, to prevent its recurrence; for after it has been formed, it can be cured only by the removal of the tooth that has occasioned it. The treatment, therefore, should be preventive, rather than curative; for the latter course can be effectually pursued only by the loss of the organ, which, if sound, is of great value. When, therefore, from the appearance of the symptoms just described, we have reason to apprehend an abscess, leeches, and such other remedies as have been recommended, for that sort of odontalgia which is produced by inflammation of the lining and investing membranes of the tooth, should be promptly employed.

Should these means have been neglected, or should they fail of success, we must then endeavor to prevent the injurious effects likely to result from the abscess, by removing the offending tooth. Many, however, unreasonably object to this practice, supposing that it is dangerous to extract a tooth, when the gum around it is

inflamed and swollen. But a tooth may be removed with as much impunity, at such a time, as at any other. The operation, it is true, is then more painful, but not so much so as need deter any one from having it performed. When the tooth occupying the affected alveolus, is extracted, the sac formed by the disease, generally comes away with it, and thus the formation of an opening for the escape of the confined matter is at once prevented.

But there are circumstances that occasionally present themselves, which render the performance of this operation impracticable, or inadvisable; such are, certain states of the constitutional health, and the fears or timidity of the patient. In such cases, the escape of the matter through the cheek or face, should be carefully guarded against, by applying suitable fermentations to the gum. As soon as the tumor upon the gum becomes soft, indicating the presence of matter, it should be punctured with a lancet, or with a sharp bistoury-pointed knife.

The application of fomentations and emollient poultices to the face, is, perhaps, under hardly any circumstances, advisable; unless, when the disease is seated in the alveolus of a front tooth, where there is no danger of an external opening; and even then I do not know that they would be productive of any advantage. When the disease is seated in the socket of a molar tooth, external fomentations tend, in a greater or less degree, to promote the passage of the matter through the cheek or face.

When an opening of this kind has been formed, it is apt to become fistulous, especially if the tooth, occupying

the affected alveolus is not extracted. Instances of this sort are not unfrequent, and, during their continuance, are a source of much annoyance and inconvenience, to the patient; and even when the discharge has ceased, and the opening healed, there generally remains a deep scar, which continues through life.

Mr. Bell mentions some very singular effects, occasioned by an abscess in the alveolus of an inferior *dens sapientiæ*. Two years before he met with the case, an external fistulous opening had been formed; through which matter was continually discharged. "At this time," says he, "a funnel-shaped depression existed in the skin, which could be seen to the depth of nearly three quarters of an inch, and a small probe could be passed through it into the sac of the abscess, underneath the root of the tooth. The abscess had now remained open for two years, during the latter of which, the parts had been in the state I have described. I removed the tooth, and, as I anticipated, no farther secretion of pus took place; but so perfectly had the communication been established, that, when the gum healed, it left by its contraction, a fistulous opening, through which a portion of any fluid received into the mouth, passed readily to the outside of the cheek; and I could, with care, introduce a fine probe completely through the passage. So free in fact was the communication, that some of the hairs of the whiskers, with which the external portion of the depression was filled, grew through the internal opening, and appeared in the mouth.

"I passed a very fine knife, resembling the couching needle, through it, and removed as perfectly as possible,

a circular portion of the parietus of the tube towards the gum; but failed in this, and several other attempts, to produce a union. It was, therefore, resolved, that the whole parietus of the depression should be removed, extending the incision as far internally as possible; and the integuments thus brought together as a simple wound. In consequence, however, of the suppuration of a small gland in the immediate neighborhood, the operation was deferred until that should have been dispersed, and it, therefore, remains, at present, in the state which I have described it."

It is scarcely ever necessary, however, in cases of this sort, to resort to any other means than those that are required for the cure of the abscess; for when that is effected, the external opening usually closes of itself. But should this not happen, the practice pursued by Mr. Bell in the case just quoted, ought to be adopted.

The irritation produced by an abscess in the alveolus of a *dens sapientiæ* is greater than that in the socket of any other tooth. Its effects are sometimes of an alarming character. The following is a case of this sort.

Seven years ago, a physician, Dr. E. who resided thirty miles in the country, sent to request me to visit him immediately. It was nine o'clock, P. M. when I received the message, and on the following morning, having rode nearly the whole of the night, I reached his residence. On my arrival, I was informed that he had been attacked two weeks before with a severe pain in the left *dens sapientiæ* of the lower jaw. After three or four days of much suffering, he called in a neighboring physician, who, after several efforts, pronounced its extraction impracticable.

The inflammation then rapidly extended to the surrounding gum, fauces, tonsil, glands, and to the muscles of the jaws and face. To these symptoms, high and intractable fever, and obstruction in the deglutition soon supervened. Fomentations to the face, free and repeated phlebotomy, and cathartics, had been employed, for the purpose of subduing the inflammation, but without effect, and the muscles of his jaws, soon became so rigid and firmly contracted, that his mouth could not be opened. His breathing also, was very difficult.

Such was the situation in which I found him. As it was impossible to introduce an instrument into his mouth, to remove the tooth that had given rise to these distressing symptoms; it was thought advisable to continue the practice that had been previously pursued, and also to administer an enema with two grains of tartarized antimony. About seven o'clock in the evening of the day on which I arrived, the fever was succeeded by alternate paroxysms of cold and heat, thus indicating that suppuration had commenced somewhere, and, from the obstruction of deglutition, it was supposed to be in the throat.

An effort was now made to pry open his mouth with a wooden wedge, which was partially successful, but still a tooth forceps, of the smallest size, could not be introduced between his teeth. While his jaws were thus partially open, he attempted to swallow some warm tea; in the effort, the tumor in his throat bursted, and discharged nearly a table-spoonful of pus from his mouth, and it was supposed that double this quantity passed down into his stomach. He obtained immediate relief, but it was not until about three o'clock, in the

afternoon of the next day, that his mouth could be sufficiently opened to permit the extraction of the offending tooth. Upon its removal, there was found attached to its fangs, which were in contact with each other, a sack about the size of a large pea, filled with pus. The cause, that had occasioned his sufferings, having been thus removed; I left him, and was soon after informed that he had perfectly recovered.

Inflammation of the investing membranes of the roots of an inferior *dens sapientiæ*, may produce effects similar to these, without occasioning the formation of an abscess in the alveolus. The cutting of these teeth, are sometimes attended with like consequences. The irritation has, in some instances, extended to the lungs and produced consumption. A case of this kind communicated to the author by Dr. M., is given in a former part of this work.

The occurrence of alveolar abscess, before the shedding of the temporary teeth, often occasions an exfoliation of the alveoli of several teeth, and sometimes of considerable portions of the jaw-bone; whereby the rudiments of the permanent teeth are much injured and sometimes entirely destroyed. It is but a few weeks since I saw a case, in which an abscess of the alveolus of the first lower temporary molaris, had occasioned an exfoliation of the sockets of a cuspidatus and of two molares. About one half of the alveolar cells of the two bicuspidates and the cuspidatus of the second set, were also exfoliated; thus leaving their imperfectly formed crowns entirely exposed.

CHAPTER XVI.

NECROSIS AND EXFOLIATION OF THE ALVEOLAR PROCESSES—ALSO, SPONTANEOUS ABSORPTION—AND DISPLACEMENT OF THE TEETH BY OSSEOUS DEPOSITIONS IN THEIR SOCKETS.

THE alveolar processes, like other bone, are covered with a membrane, which is called their periosteum. From this, they derive their nourishment and support, and when, from any cause, the connection or vascular intercourse between the two, is destroyed, a necrosis inevitably follows.

The destruction of this membrane, and its separation from the alveolar processes, is the effect of inflammation, which, no matter from what cause produced, provided it be excessive and long continued, is generally followed by this result.

The alveoli being thus deprived of vitality, at once become a source of irritation to the living bone with which they are connected, and in conformity with a law of the economy, an action is immediately gotten up for their removal. This process is effected by the absorbents, and consequently is slow in its progress.

Although the sockets of the teeth are, like the other bones, liberally endowed with blood vessels, and affected with necrosis and exfoliation from a like cause and in a similar manner, yet there is, in one particular, a striking difference between them and the other bones of the body. In the alveoli, the loss of substance occasioned by necrosis and exfoliation, is never restored, while in the other bones, it is soon repaired by a formation of new bone.

The exfoliation of the alveolar process is accompanied by a discharge of matter peculiarly disagreeable and annoying to the patient. As the disease progresses, the gums become soft and spongy, and assume a dark purple appearance.

Mr. Fox has presented us, in his work on the teeth, with two drawings of exfoliated alveolar processes. The first represents the alveoli of a central and lateral incisor, and that of the left cuspidatus, with a portion of the maxilla, about five-eighths of an inch above the apex of the roots of the last mentioned tooth. The subject of this case, was a gentleman whose left lateral incisor became carious; inflammation and pain ensued, together with a swelling of the gum and lip. Instead of consulting a physician, he applied poultices to his face, until suppuration in the alveolus took place, forming an external opening through the gum for the discharge of the matter. After his mouth had remained, for some time, in this condition, he applied to Mr. Fox, who upon examination, found that not only the decayed tooth had become loose, but also one on each side of it. The first he extracted and discovered that its alveolus, from the destruction of its periosteum, was quite rough. The adjoining teeth still continuing loose, they were, in a few

weeks, removed, and the slight force, that was applied, brought with them the alveolar processes of the whole of the three teeth, and also a considerable portion of the jaw-bone. The other drawing of Mr. F. represents an inferior molaris and two bicuspidcs, together with their sockets and a very large piece of the maxilla. Their exfoliation originated from the same cause as that in the other case, namely, alveolar abscess.

The author has seen several cases very similar to these, though not all produced by the same causes. Two of them have been already noticed.*

For the treatment of cases of this kind, little can be done. So soon, however, as the dead portions of bone become so much separated from the living, that they can easily be removed, they should be taken away by means of a pair of forceps. To correct the offensive odor, and disagreeable taste occasioned by the constant discharge of fetid matter, a wash of diluted chloride of soda, or of the tinct. of myrrh may be employed. For any other purpose than this, I have not been able to perceive that local applications, are of any advantage. Should constitutional symptoms supervene, tonics and a generous diet should be recommended.

SPONTANEOUS ABSORPTION OF THE ALVEOLAR PROCESSES.

While treating of spongy and inflamed gums, &c., I adverted to the spontaneous absorption of the sockets of the teeth, it only now remains to add a few remarks in addition to what was then given on this subject.

* Vide p. 126 of this work.

The absorption of the alveolar processes, which is generally observed in persons of an advanced age, has been conclusively shown not to be an indication or the result of the decline of the physical powers of the body, and when there are no decayed teeth, or tartar, present in the mouth, and when also its fluids are in a healthy state, I think there is nothing more likely to produce this absorption than the pressure on the sockets, resulting from a crowded condition of the teeth. The following remarks of Mr. Fox, strongly support this supposition.

“In a majority of cases, in which this disease occurs,” (from whatever cause produced,) “the teeth are perfectly sound, and from numerous observations, I think I may venture to assert, that persons, who have had several of their teeth affected with caries in the earlier part of life, are not liable to loose, by an absorption of their sockets, those which remain sound; but, where the teeth have not been affected with caries in the early part of life, persons, as they approach fifty years of age, and often much earlier, have their teeth become loose from absorption, or a wasting of the alveolar process.”

This fact cannot have escaped the observation of any dentist, and may serve strongly to illustrate and confirm the views given on this subject in a preceding part of the present treatise. The loss of three or four teeth at an early period of life, free the alveoli, from pressure, and thus the consequent irritation in their membranes is prevented.

DISPLACEMENT OF THE TEETH BY DEPOSITIONS OF BONE
IN THEIR SOCKETS.

The filling up of the alveolar cavities with ossific matter is a species of exostosis, and is generally confined to the front teeth, and more especially to the incisors, though in some instances it has been known to attack the sockets of the bicuspides, and sometimes those of the molares. The teeth, as the deposition progresses, are raised from their sockets, and caused to assume an elongated appearance, and eventually to drop out.

It generally commences in the alveoli of the central incisors, and it rarely happens, that more than one socket is affected by it at the same time. It almost always begins at the bottom of the cavity, though it sometimes commences on one of its sides, and by forcing the tooth against the opposite, occasions a corresponding absorption. Irregularity in the arrangement of the teeth is, in this manner, not unfrequently produced, especially, when more than one socket is thus affected at the same time. The central incisors are sometimes forced apart; at other times they are forced against each other, and caused to overlap. The deposition of bone, however, being generally confined to the bottom of the sockets, the teeth are more frequently thrust from their alveolar cavities, and when this oc-

curs with a person, whose upper and lower teeth fall plumb upon each other, it occasions great inconvenience; for, the projecting tooth must either be thrown from the circle of the other teeth, or, by striking its antagonist, prevent the jaws from coming together.

To remedy this evil, the projecting tooth should, from time to time, as it becomes elongated, be filed off even with the others; but in performing this operation great care should be taken not to jar it. Mr. Bell, however, objects to this practice. He says, that "instead of remedying the evil, it increases it, by exciting to a still greater degree, the action of the vessels of the periosteum; whilst it also shakes and ultimately loosens the affected tooth." But this objection does not seem to be predicated upon facts or sound reason. The constant striking of a tooth thus circumstanced against its antagonist, must, of necessity, jar it more than the action of a file; and I have usually observed that teeth thus affected, when left to themselves, generally soon become loose, and if they did not in a short time drop out, were rendered entirely useless. On the other hand, I have known them, by being from time to time filed down even with the other teeth, to remain comparatively firm in their sockets for years.

That this affection is the result of some peculiar diathesis of the alveolar membrane, is evident, but what causes this peculiar action, yet remains to be found out. A diseased state of the gums can have no agency in its production, for it most frequently occurs in individuals, whose gums are perfectly healthy; and if it were the result of any constitutional tendency, all

the teeth would be as likely to be affected by it, as those I have mentioned.

My own opinion is, that this affection is brought on by irritation of the alveolar membrane, produced by the pressure of the tooth; for I have observed, that the fangs of teeth, whose alveoli are affected with bony depositions, are generally less conical in their form than others, consequently their pressure in the alveolar cavities is unequal, being greater against the bottom than against the sides. Bony depositions on the sides of the alveoli, are probably occasioned by irregularity of the teeth, whereby their uniform pressure against their sockets has been destroyed. This seems to me the most rational cause that can be assigned for this affection.

CHAPTER XVII.

THE EFFECTS OF MERCURY, TOBACCO, AND SNUFF,
UPON THE TEETH, GUMS, &c,

MUCH has been said and written in relation to the effects of these articles upon the teeth; but there still exists much error of opinion in regard to them, and on this account we are constrained not to pass them by in silence.

EFFECTS OF MERCURY.

Mercury does not, as many imagine, exert any direct action on the teeth; it is only by the effects that it sometimes produces in the gums and the secretions of the mouth, that they are injured by its use. When it is given in sufficient quantities, and long enough to produce ptyalism, however slight, it becomes hurtful to the teeth, and just in proportion, as it affects the juices of the mouth, is the corrosive properties of these fluids increased. Hence, it can be considered only as an indirect cause in the production of caries.

The relation which the teeth sustain to the maxillæ, however, is often very seriously affected, and sometimes entirely destroyed, by the exhibition of this medicine. Its introduction into the system is generally followed by an increased action of the absorbents, and in no part of the body is this more evident than in the gums and alveolar processes. It sometimes occasions a very rapid loss of substance in these parts, so that the teeth, by the absorption of their sockets, are loosened, and, in a few months, caused to drop out. A few years ago, an application was made to me, for a set of artificial teeth and gums, by an interesting young lady, of only twenty years of age, who had lost nearly the whole of her teeth, by the absorption of her gums and alveolar processes. She informed me, that about four years before, she had been afflicted with a severe attack of bilious fever, and during its continuance, had taken a great deal of mercury, and, in consequence, had been so badly salivated, that her teeth were loosened, and soon after her recovery, dropped out one after another, in spite of the efforts of several physicians and dentists to preserve them, until only nine remained.

The deposition of tartar upon the teeth, is much increased by the use of this medicine, especially when it affects the saliva. So much, in fact, is the tendency to a deposition of this substance, increased by its exhibition, that persons laboring, for the first time, under a mercurial diathesis, frequently have the crowns of their teeth, opposite the mouths of the salivary ducts, completely coated with it in a few days.

In its administration, therefore, great care should be taken to prevent the injurious effects, that may

result from its use. Though, when given with proper precaution, it is perfectly safe in its action, yet, as a general rule, it should never be administered except by a person acquainted with the indications that it is expected to fulfil. It is not my purpose to discuss the merits of this article, but only to notice its effects upon the teeth, gums, &c.—yet at the same time, I cannot forbear deprecating the profuse and careless manner in which it is but too frequently given by persons unacquainted with the curative indications of those diseases for which it is usually prescribed. Its remedial virtues in many diseases, have been amply tested, so that its claims to confidence, rest on no doubtful foundation, and the most eloquent panegyric, that can be pronounced in its praise, is found in the hundreds of lives, that it every year rescues from an untimely and premature grave. Its powerful and valuable medicinal properties, have gained for it a justly deserved and high reputation; yet the popularity thus worthily acquired, has given to its use a license replete with mischief. The imprudent manner in which it is frequently and excessively administered, during infancy and childhood, while the permanent teeth are being formed, cannot be too strongly censured. A mercurial action in the system, at these early periods of life, exerts a most deleterious influence on the physical structure of these organs, whereby their future liability to decay is greatly increased.

The symptoms indicating a mercurial diathesis of the general system, are, a slight swelling of the tongue; soreness and increased redness of its edges; soreness, tumefaction, and preternatural redness of the gums, with a tendency to bleed from the slightest injury;

fetor of the breath; viscid saliva, accompanied with a much more copious discharge than usual; thickening of the aveolor periosteums, and loosening of the teeth. Such are the diagnostics, that may be regarded as the criteria of the specific or constitutional action of this medicine.

When given without proper care, and for any considerable length of time, it sometimes gives rise to sloughing and ulceration of the gums, and to necrosis and exfoliation of the aveolar processes, as also of portions of the jaw-bone. Cases of this kind are of frequent occurrence. Several have come under my own observation, within the last four or five years; for the particulars of one of which, the reader is referred to that of Mr. M——, page 126. Ulcers of the gums, arising from an excessive use of mercury, sometimes assume a very malignant character, and are exceedingly difficult to cure.

Some persons are much more susceptible to the action of mercurial medicines than others. A single dose will, in some instances produce ptyalism, while in others, a half dozen may be taken within a few hours of each other, without at all affecting the secretions of the mouth.

The gums, after having been once affected with mercury, are ever after more susceptible to the action of irritants, and consequently more liable to become inflamed, than they otherwise would have been. "However perfectly," says Mr. Bell, "the effects of mercury may have subsided, even where no permanent injury appears to have been produced in the teeth, and where the common symptoms of its action have entirely ceased

to exist, it is not at all an unfrequent circumstance, that after the lapse of a longer or shorter period, sometimes even several years, the teeth become loose, absorption of the gums and alveolar processes take place, and the early loss of the teeth is the consequence of an affection, the disappearance of which, for so long a time, had persuaded the patient that all danger of subsequent injury had ceased."

In conclusion, it is only necessary to observe, that, for the removal of the effects produced by the use of this medicine on the gums, a plan of treatment should be adopted, similar to that previously recommended for spongy and inflamed gums. The offensive fetor of the breath may be corrected by frequently washing the mouth with diluted chloride of soda, or with the tinct. of myrrh.

TOBACCO.

In the supposed protective virtues of tobacco to the teeth, many find a ready excuse for its use. But its preservative properties, if indeed it possesses any, have been greatly overrated. It is undoubtedly true, that, being a stimulant and narcotic, it will sometimes obtund the pain of an aching tooth; but even the relief thus obtained is, at best, only temporary, and principally confined to those unaccustomed to its use; for those, who are in the daily habit of chewing or smoking, are as much subject to tooth-ache, as those unaccustomed to the use of this article.

As to the effects produced upon the teeth themselves,

by the use of tobacco, I know not that it matters much in what manner it be used, whether by chewing or smoking. Directly, it may be said to affect these organs, neither beneficially nor prejudicially. The increased flow of saliva which it occasions, may, perhaps, by diluting such vitiated humors, as happen to be in any of the interstices, or indentations of the teeth, and thus lessening their corrosive and acrid properties, render them less hurtful; yet this benefit is probably more than counterbalanced by its pernicious effect upon the gums. The constant state of excitement in which they are kept by its use, is apt, unless the greatest attention is paid to the cleanliness of the teeth, to produce, especially in persons of a cachetic habit, a sort of chronic inflammation, and, in those of a strumous temperament, debility.

In treating of the effects of this herb, Dr. Fitch observes: "I have noticed persons having good teeth, who had used tobacco, both smoking and chewing it, for a great number of years. On the other hand, I have seen persons with very bad teeth, who used tobacco. In some constitutions, it removes its irritability; in others it increases the irritability of the system. And when we look over the causes of caries, diseased gums, &c., we shall find that the fact respecting the operation of tobacco, which we have noticed, explains its good and bad effects on different individuals. There is an acrimony or impurity about some tobacco, which causes it to injure the teeth; but my observations, as to the effect of good tobacco, are, that by some individuals it may be chewed with impunity, and that smoking tobacco may be allowed."

This article, as Dr. F. remarks, differently affects the general health of different individuals. While some can use it with impunity, its effects upon others are such, that many, even after having used it for a number of years, have been compelled to relinquish it entirely. A person of strong constitutional health, full habit, and of a sanguino-bilious temperament, may employ it moderately without injury, and, in some cases, with advantage; but to one oppositely constituted, it is more or less productive of hurtful consequences. It is not, however, our design to treat of the constitutional action of this weed, but only to notice its operations on the teeth.

From the coloring matter contained in tobacco, the teeth of persons, who chew large quantities of it, become, if great care be not taken to keep them clean, in a few years, so much stained, that they present a most filthy and disgusting appearance. Moreover, their teeth usually suffer a more than ordinarily rapid loss of substance, especially when the front ones fall plumb upon each other, from the constant abrasion, to which they are thus necessarily subjected.

Having thus briefly noticed the consequences that are likely to result to the teeth, from the use of this article, when chewed and smoked, I shall proceed to offer a few remarks on the manner, in which it affects these organs, when employed as a dentifrice.

SNUFF.

Within the last few years, snuff has, in some parts of the country, become quite popular as a dentifrice, especially with females. The teeth suffer more from

the use of tobacco in this form, than in any other. Being reduced to a powder, its fine particles find a more easy lodgment beneath the edges of the gums, around the necks of the teeth, in their interstices, and various indentations and fissures, than when taken into the mouth in any other manner. These particles not only thus serve as nuclea, around which the thickened and vitiated secretions of the mouth may gather, but also, from their stimulative properties, and their long retention beneath the edges of the gums, and in the crevices of the teeth, are productive of much irritation, both to the gums and the periosteums of the roots.

I have observed, that the gums of persons, who have used snuff as a dentifrice, for any length of time, usually have a dark purple, and sometimes a yellowish appearance, are soft and spongy, more or less isolated from the teeth, and that the teeth themselves are not unfrequently very much loosened. In fact, I do not recollect ever to have known an instance, of an individual's using tobacco in this way, two or three times a day, for several years, without the teeth and gums being thus affected. In some cases, however, it is much longer in producing these deleterious consequences, than in others. Much depends upon the condition of the gums, at the time its use is commenced. If they be healthy, and firmly adhere to the necks of the teeth, it may be employed for some time, without being attended with any very obvious injury; but if they be at all diseased, a deleterious influence will soon be manifest. Viewing the subject in this light, and believing the opinion that we have here advanced, to be sup-

ported by the observation of every one, whose attention has been at all directed to the subject, we cannot but condemn the use of this article as a dentifrice; and recommend to every dentist, to particularly caution persons consulting him, and especially females, against thus employing an article that is productive of such pernicious consequences to the teeth.

Nor are its effects upon the general health less injurious. Persons who use snuff in this manner, are generally observed to have a pale, sallow countenance, especially if their constitutional habit be at all delicate.

CHAPTER XVIII.

ARTIFICIAL TEETH.

CONTRIBUTING, as the teeth confessedly do, to the beauty and expression of the countenance, to the proper enunciation of language, and by the important functions which they perform, to the health of the whole system; it is not at all surprising, that their loss should be considered as a serious affliction, and that art should be called in, to lend her aid in supplying the deficiency. And to such perfection has the manufacture and insertion of artificial teeth been brought, that many of them, at the present day, so closely resemble the natural organs, that it is often difficult, even for the most experienced observer, to detect wherein they differ from those placed in the mouth by nature. Few operations of dental surgery are more sought after than this; and, although art can never equal nature, yet, artificial teeth, when inserted with proper judgment and skill, may be made to subserve, in most respects, the purposes for which the natural teeth were designed. On the other

hand, their improper insertion has often been productive of much mischief to such of the natural teeth as remained in the mouth, and not unfrequently to the health of the general system.

This operation, though acknowledged to be of great importance, and performed by every one having any pretensions to a knowledge of dentistry, is, unfortunately, generally the one least understood. By its improper performance, the mouth is frequently so much injured, that all attempts to restore it to health, are rendered abortive. An artificial tooth imperfectly inserted, often occasions the two adjacent teeth to loosen and drop out; and if the deficiency thus produced, is again unskillfully supplied, the destruction of two other teeth will, in all probability, follow. In this manner whole sets are frequently destroyed.

A correct knowledge of the anatomy of the maxillary organs, mechanical tact, surgical skill, and experience, are necessary to enable a person to construct, adapt, and insert, artificial teeth, to suit every variety of case that require them, so as not to injure the parts with which they must be connected, or the health of the general system; and at the same time to subserve, to the greatest possible extent, the purposes of the natural organs, and to be inartificial in their appearance.

A mere knowledge of the principles upon which artificial teeth are inserted, is not all that is required, to fix them properly in the mouth. It often happens, even when these are well understood, that there is such a want of proper construction and adaptation, especially when they are not engrafted on natural roots, that they cannot be worn with any degree of comfort

or satisfaction, and, in such cases, they are often productive of injury to the whole mouth, and sometimes occasion the loss of the remaining teeth.

For the proper preparation of artificial teeth, and of the fixtures that are necessary to confine them in the mouth, as much mechanical nicety is requisite, as for the construction of the various parts of a watch, or of any other complicated piece of mechanism. There is certainly more ingenuity and tact required in the former case, than in the latter; for, in no two instances, are the fixtures for the fastening of artificial teeth, required to be entirely alike; whereas, in the making of a watch, the artist is governed by fixed rules, and relies simply on his manual dexterity, without being compelled to employ his powers of invention.

The obstacles to a due performance of the duties connected with this branch of the profession, are greater than any, except an experienced practitioner, can imagine. Besides the difficulties to be met with, in procuring teeth of the proper kind, there are others equally great; as, for instance, the loss of a tooth in one jaw disposes that with which it antagonized in the other, to protrude from its socket, and to occupy, when the mouth is closed, the vacant space formerly filled by the lost organ; consequently, when an artificial tooth is inserted, it strikes against it in such a manner, as to prevent the other teeth from coming together. This tendency of the teeth to protrude from their sockets, in one jaw, is always in proportion to the number of teeth lost in the other; and, consequently, often becomes so great an obstacle to the proper insertion of artificial

ones, that all the ingenuity of the dentist is required to overcome it.

The greatest mechanical skill and tact is requisite, in order to do full justice to this branch of the art; and, unfortunately, many are unwilling to devote to it the time and attention necessary to acquire them. There are, however, in this country, some, and it gives me pleasure to say it, who have applied themselves with so much diligence and perseverance, that they have overcome, perhaps, every surmountable difficulty; and have thus been able to exhibit as fine specimens of artificial teeth, of American manufacture, both in point of mechanical execution, and in the ingenuity displayed in their construction, and manner of insertion in the mouth, as are to be found in any other country in the world.

Our larger cities have of late been supplied with artists, who devote themselves almost exclusively to the preparation of artificial teeth, and, consequently, when under the direction of a skillful dentist, are able to prepare them in the most perfect manner. The dentist, however, should be thoroughly acquainted with every part of the business, in order properly to direct the artist, and even to give a portion of his personal attention to the setting up of the teeth; otherwise they may be such as will not be durable, or capable of being worn with comfort by the individual for whom they are designed. The services of such a person to one, who has a large practice, are invaluable, for by them he is relieved from the drudgery of the most laborious and least profitable branch of the profession.

Facilities like these, however, can seldom be enjoyed

by dentists residing in the country or small towns; consequently they should be provided with all the necessary fixtures for attending to the mechanical, as well as the surgical parts of the profession; otherwise the sphere of their usefulness will be very much abridged, and they will be unable to render those services that the public have a right to expect from them. There are many persons, by nature, capable of executing the most intricate and complicated pieces of dental mechanism; but who, by undertaking that for which they were unprepared, or for which they lacked energy and perseverance to perform, have brought obloquy and reproach upon themselves and a profession to which they otherwise might have been an honor. Others, again, not possessed of either theoretic knowledge, or mechanical ingenuity, regardless of consequences, boldly undertake the insertion of teeth in the most difficult cases. Were their incapacity known, the result of their operations would not be matter of surprise, or of so much regret; but, unfortunately, this not being the case, the resources of the art are often improperly estimated.

These difficulties are not mentioned to discourage the young practitioner; but to excite in him a desire to overcome every obstacle, and to attain to the highest point of excellence in his profession. If he be possessed of the requisite mechanical tact and ingenuity, he may, by perseverance, in a few years, become master of the art, and be able to render to those who may seek his services, benefits, which will ever afterwards be remembered with the liveliest gratitude. On the other hand, if he lacks this desire for excellence, and is influenced only by mercenary and sordid views, relying

for success upon the artfulness of his address and unjust pretensions; he may, for a time, obtain the approbation of a few, and thus acquire a short lived reputation; but he will never be able to enjoy the consciousness of having been professionally useful, and, sooner or later, he will be visited with the just indignation of those, who have suffered from their credulous reliance on his skill and ill founded reputation.

Many have chosen dentistry as a profession, with the belief that a knowledge of it was more easily acquired, than that of any other; and some, after having followed it for two or three years, and finding that, in order to attain respectability and usefulness in it, greater difficulties were to be surmounted than they had anticipated, have preferred to abandon it altogether, rather than to bring disgrace upon both it and themselves. Let no one, therefore, be deceived into a belief, that, in a few weeks or months, he can become master of the art; for, should he commence its study under such an impression, he will most assuredly be disappointed, and, perhaps, find, after having devoted to it what he before thought sufficient time to its entire acquisition, that he has scarcely attained to a knowledge of its elementary principles.

The information to be obtained from works on the mechanical part of dentistry, is exceedingly limited. It is truly surprising that, from the number of authors, who have written on the surgery of the teeth, this subject should have received so little attention. Fauchard, Bourdet, Angerman, Laforgue, Jourdain, Maggiolo, Maury, Delabarre, Koecker, and a few others, are all who have given it any thing more than a pass-

ing notice; and of these, Delabarre is by far the most minute. His treatise on the mechanical parts of the art of the dentist, is a work of much merit. In it, the various methods of inserting artificial teeth are accurately and minutely described, together with the advantages and disadvantages, that are likely to attend each. But, how perfect soever the work may have been at the time of its publication, yet it does not give the student all the information, that it is necessary for him, at the present day, to possess; for since that period, many improvements have been made in this part of the profession, with which it is important that he should be acquainted.

Among the English writers, Koecker is almost the only one, who has given particular directions for the insertion of artificial teeth. His "Essay on Artificial Teeth, Obturators and Palates," contains much useful and valuable information. The various manipulations through which the teeth must pass, preparatory to insertion, have not been described by him with sufficient minuteness, to be comprehended by the student, yet, to one having a knowledge of them, his essay will be found very serviceable. It exhibits the principles, upon which the deficiencies of the natural organs should be supplied; and, what is very important, the necessary preparatory surgical treatment of the mouth.

As the ability properly to execute the mechanical parts of dentistry, can only be acquired by a regular apprenticeship, Mr. K. perhaps thought, that a more minute description than that he has given, would be unnecessary; but there are many practitioners, who, in other respects competent, have not enjoyed this advan-

tage, and, consequently, would have been much benefited by his dwelling more particularly on this point.

The want of a work in the English language, devoted exclusively to this subject, has been a source of great inconvenience to many of the profession, and of much evil to the world at large. In the absence of a suitable guide, the inexperienced have been compelled to depend solely upon the suggestions of their own minds, which, unaided, and untested by the experience of others, are as likely to be wrong as right. Thus many have undertaken to perform operations, which, had they been fully aware of their delicate nature, they never would have attempted; but would rather have declined them altogether, than have endeavored to execute that for which they knew themselves incompetent. Others, again, refuse to insert artificial teeth, even in cases requiring but little skill; because they think themselves not fully acquainted with the manner in which it should be done.

To such persons as have been just mentioned, a work devoted exclusively to the mechanical parts of dentistry, would be invaluable; and it is to be hoped that the time is not far distant, when some competent person will present the profession with a gift so highly valuable. In the mean time, should the present work, in any degree, contribute to facilitate the labors of the young practitioner, in this department, the author will feel himself well compensated for the time and attention it may have cost him. He is aware, that the limits to which he has confined this subject, are too narrow to allow him to do it full justice; yet he hopes, by restricting himself to things the most important, to be able

to convey a sufficient amount of information, to enable the student properly to comprehend the manner of supplying any loss, that may occur in the dental organs, from a single tooth to an entire set.

The first thing, then, that claims our attention, in this undertaking, is the surgical treatment of the mouth, which is sometimes required, in order that the artificial teeth may be rightly applied.

CHAPTER XIX.

SURGICAL TREATMENT OF THE MOUTH, PREPARATORY TO THE INSERTION OF ARTIFICIAL TEETH
—DIFFERENT KINDS OF ARTIFICIAL TEETH, &c.

IN the insertion of artificial teeth, the health of the mouth is often too little regarded; and hence, in the majority of instances, result the evil effects, that are generally attributed solely to their use. No artificial apparatus, no matter how correct soever it may be in its construction, or in the mode of its application, can be worn in a diseased mouth, without injury to the teeth. Of this fact, every day's experience furnishes us with abundance of proof. Yet there are some practitioners, who are so regardless of their own reputation, and the consequences to the patient, that they are willing to insert artificial teeth, under every variety of circumstances. The dentist, however, is not always to blame for omitting to employ the means necessary for the restoration of the mouth to health. The fault not unfrequently lies with the patient. There are many who, even after having been fully informed of the injudiciousness of

such mal-practice, will still persist in requesting it to be adopted. But, even under such circumstances, the dentist should never yield: if he finds that he will not be allowed to pursue that course of treatment, which will be advantageous to those who consult him, he should decline rendering any services whatever.

“There is, perhaps,” says Mr. Koecker, “not one case in a hundred, requiring artificial teeth, in which the other teeth are not more or less diseased, and the gums and alveoli, also, either primarily or secondarily affected. The mechanical and chemical bearing of the artificial teeth upon such diseased structures, naturally becomes an additional powerful aggravating cause of the disease, already in a sufficient state of excitement, even if the teeth are mechanically well contrived and inserted; if, however, they are not well constructed, and are inserted with undue means or force, or held by too great or undue pressure, or by ligatures or other pernicious means for their attachment, the morbid effects are still more aggravated, and a general state of inflammation in the gums and sockets, and particularly in the periosteum, very rapidly follows. The patient, moreover, finds it impossible to preserve the cleanliness of his mouth; and his natural teeth, as well as the artificial apparatus, in combination with the diseases of the other structures, become a source of pain and trouble; and the whole mouth is rendered highly offensive, and disgusting to the patient himself, as well as to others.”*

* Vide Koecker's Essay on Artificial Teeth, p. p. 27, 28.

The first business, therefore, of the dentist, when he is applied to for artificial teeth, is to ascertain the condition of the gums, and that of the remaining teeth. If disease be found to exist here, such treatment should be adopted, as the circumstances of the case, may indicate, and perseveringly persisted in, until health be entirely restored. The remedies, however, in these cases, have been noticed in the preceding pages, and, therefore, do not require to be here again detailed. But, before this part of the subject is concluded, we will take the liberty of throwing out a few remarks, on the impropriety of inserting artificial teeth, too soon after the mouth has been submitted to the necessary surgical treatment.

When they are to be fastened in the mouth by any other means than by being engrafted on natural roots, sufficient time should elapse before their insertion, to allow those changes that follow the treatment which usually becomes necessary to the restoration of the mouth to health, to be fully completed; otherwise, instead of being worn with comfort, they will become a source of constant irritation.

Hence, it not unfrequently happens, that, after one set has been prematurely applied, another, in the course of a few months, becomes absolutely necessary, in order to secure the comforts which artificial teeth, when properly employed, are capable of conferring; and also to avoid the mischievous consequences that are likely to arise from their injudicious application. I have now in my possession, many portions of sets, containing from two to ten teeth, which, by pressing

unequally upon the gums, on which they rested, occasioned so much irritation, that their removal became absolutely necessary. The persons from whose mouths I took them, assured me that, at the time they were first placed there, they fitted very accurately, and were for a time worn without any inconvenience whatever. At the time of their removal, some of them, in different places, were nearly half an inch from the gum. This occasioned so great a pressure on those parts, where they did touch, that violent inflammation was produced. Nor was this the only inconvenience. The vacant spaces, that had thus been formed between the gum and plate, on which the teeth rested, afforded a ready lodgment for extraneous matter, which, from its being retained until it became putrid, not only was an additional source of disease to the remaining natural organs, but also gave to them a foul and nauseating breath, which, to their friends, was exceedingly annoying and offensive.

The circle of the maxillary arch is always lessened by the loss of the teeth and the absorption of their sockets. The contraction that is occasioned by the loss of the incisors, cuspidati, and bicuspides, is usually equal to the width of two of the teeth last named consequently, to supply this deficiency, only eight artificial organs would be required. Thus we see, that artificial teeth, when inserted too soon, are liable to lose their adaptation to the gums, and the correspondence of their circle with that of the maxillary arch.

It is sometimes necessary to wait eight or nine months, after the extraction of natural teeth, before we can supply their places by art. The absorption of

the alveolar processes, however, are often so far advanced, previously to the performance of this operation, that a much shorter space of time, will suffice for its completion.

Most persons, who stand in need of artificial teeth, and have made up their minds to submit to the necessary preparatory operations, are generally unwilling to remain without them long enough for the alveolar processes to become entirely absorbed; and dentists are too often induced, in opposition to their own judgment and experience, to comply with their earnest wishes, when not more than one-third of this process of absorption has been completed.

DIFFERENT KINDS OF ARTIFICIAL TEETH.

There are certain qualities, which it is highly important that artificial teeth should possess. The principle of these, are durability, and a resemblance to the the natural teeth, with which they are to be associated. If they lack the first of these requisites, the contrast between them and the natural organs, will be such as to mar that agreeable expression of countenance; which a row of teeth, regularly arranged, of the same color, is so well calculated to impart. They, moreover, in this case, subject the person, who uses them, to ill natured and annoying remarks. If they are not durable in their nature, they will need to be frequently replaced, and will thus occasion much inconvenience and expense; especially if the wearer of them does not reside con-

venient to one who is capable of performing the operation aright.

In the attainment of these qualities, much depends on the kinds of artificial teeth that are employed, and also on the material of which the fixtures, connected with them, are composed. I shall, therefore, offer a few remarks on the various sorts of teeth, which are in most common use, and endeavor to point out the advantages and disadvantages of each.

The teeth most commonly employed, are,

1st. Human teeth.

2d. Teeth of neat cattle, sheep, &c.

3d. Those formed of the ivory of elephant's tusks, and of the tooth of the hippopotamus.

4th. Porcelain teeth.

HUMAN TEETH.

As far as it regards appearance, which is certainly an important consideration, artificial human teeth are preferable to any other. They should be of the same class as those whose places they are designed to supply. Their crowns only are employed, and if they are judiciously chosen, and properly inserted, their artificial connection with the mouth cannot be detected, even by the most experienced eye.

The durability of these teeth depends on the density of their bony structure, the character of their enamels, and the condition of the mouth in which they are placed. If they be of a compact texture, possessed of

sound and perfect enamels, and inserted in mouths in a healthy condition, they will last from eight to twelve, or even a greater number of years. There is, however, so great a difficulty in procuring these teeth, that but few of the number that are employed, are found to be perfect. Moreover, the mouths in which they are placed, are not always healthy at the time of their insertion; and even if they be, still they are continually exposed to the action of so many causes of disease, that there is but little chance of their long continuing to be in a right condition; hence, it generally happens, that these teeth do not endure for more than one half the periods above mentioned. They are not unfrequently destroyed by decay, in two or three years, and that, even if they be of the most perfect kind. In one case, I inserted five of these teeth of as fine a quality as I have ever seen, and in fifteen months after, they were entirely destroyed.

A human tooth, when artificially inserted in the mouth, is just as liable to decay as that placed there by nature. It is, perhaps, even more likely to be destroyed than a living tooth. In being transferred from one mouth to another, it not only loses its vitality, but also becomes more exposed to the action of deleterious chemical agents; for it cannot be adapted to whatever it is to be attached, in so nice a manner as perfectly to exclude fine particles of extraneous matter from being retained between them; and we have already shown the consequences that usually result from such a retention. Exposed, therefore, as these teeth must, of necessity, thus be, we cannot expect them, on the whole, to last more than about five years. But

of all the animal substances used for this purpose, human teeth are certainly the best. They are harder than those made of other sorts of bone, more protected by enamel, and consequently better calculated to resist the action of the various corrosive agents to which they may be exposed.

Many, however, object to having these teeth placed in their mouths, because they suppose that teeth, taken from the mouths of persons who have died of infectious disorders, disease may be communicated by their insertion. This, however, is a mistaken notion; for, the purifying processes through which they are passed previously to their being inserted, are such as to preclude the possibility of infections being thus communicated. Instances of diseases being communicated in this way, were frequent when the practice of transplanting teeth from the mouth of one person into that of another was in vogue; but, since that has been discontinued, an occurrence of the kind has not been known. The prejudices of some, however, against having these teeth placed in their mouths, are so strong, that it is impossible to overcome them.

The procuring of good human teeth is attended with great difficulty; and, were they the only kind employed, the demand for them would be so great, that, notwithstanding the prejudices of many against their use, not one-fourth the quantity required could be supplied. They are generally obtained from battle fields and from those persons who furnish subjects for dissecting rooms. Comparatively few, however, of the number thus obtained, are fit for use; they are either diseased or otherwise imperfect. This difficulty, together with the

high price they command, has induced many practitioners to profit by the popular prejudice against them, and to employ other substances in their stead.

TEETH OF CATTLE.

Of the various kinds of bone used for artificial teeth, the teeth of neat cattle are, perhaps, after those just noticed, the best. By a little alteration in their form, they may be made to bear a close resemblance to the incisors of some persons; but they are not, on account of their shape, suitable to supply the place of a cuspidatus; and, in a majority of cases, they are altogether too white and glossy to match the human teeth. The striking contrast, therefore, that they form with the natural organs, should, even were there no other objections, prohibit their use. This, however, is entirely disregarded; indeed, many of those who wish artificial teeth, suppose that their brilliancy cannot be too great, and this, with them, outweighs every other consideration.

It is essential to the beauty of a denture, that the teeth be of the same color. When we meet with one composed of teeth of a uniform color, even though rather darker than usual, we are better pleased with it than we are with another, whiter in its appearance, but more variegated in its hues.

There are other objections to the use of these teeth, besides those that have already been urged. The imperfect manner in which they are protected by

their enamels, and the looseness of their texture, render them more easily penetrated by the juices of the mouth, than human teeth, in like circumstances, and, consequently, more exposed to the deleterious action of these fluids, when, from any cause, they become impure. Every part being thus exposed to this subtle, pernicious influence, no reliance can be placed on their durability. They sometimes last from four to eight years, but in the greatest number of cases, not longer than from two to three. It but rarely happens that they can be employed; for, by the time their cavities have become sufficiently filled with osseous matter, to give them the stamina necessary for artificial teeth, their crowns are generally so much worn away, that they are unsuitable for the purpose, unless in those cases where very short teeth are required. They may be very useful to supply the place of short central incisors; but they are, in general, altogether too wide to be conveniently substituted for the lateral. The only way in which they can be adapted to this purpose, is to cut away, from their lateral surfaces, half of their substance, which so much weakens their structure, that they are liable to break on the reception of the slightest violence.

But ill suited as these are to supply the loss of the natural organs, they are better calculated for the purpose than many that are made of other kinds of bone. They are generally procured from the butchers. The beeves, from which they are taken, should be from seven to nine years old; if they are younger, the cavities of the teeth will become exposed in being filed to the proper size; and if they are older, the teeth will generally be too short.

The teeth of sheep sometimes answer tolerably well for lateral incisors. They are harder than the teeth of neat cattle, and, from the smallness of their size, require no filing except to fit them to the roots upon which they are to be placed, and to give a proper shape to their cutting edges.

TEETH MADE FROM THE IVORY OF THE ELEPHANT'S TUSK,
AND THAT OF THE TOOTH OF THE HIPPOPOTAMUS.

The employment of these materials for artificial teeth, has been sanctioned by usage from the earliest periods of the existence of this branch of the art; but we must not hence conclude that it has been approved by experience. On the contrary, of all the substances that have been used for the purpose, these are certainly the most objectionable.

The ivory of the elephant's tusk is decidedly more permeable in its nature than that obtained from the tooth of the hippopotamus. So readily does it absorb the fluids of the mouth, that, in three or four hours after being placed there, it will become completely penetrated with them. Consequently, it is not only liable to chemical changes, but also to become offensive, and when several teeth, formed from it, are worn, they affect the breath so much, that it is exceedingly disagreeable to come within its influence. Teeth, on account of its softness, are easily shaped from it, but not being covered with an enamel, they soon become dark, and give to the mouth a most filthy and disgust-

ing appearance. Fortunately, however, this article is, at present, but rarely used for the purpose.

The ivory of the hippopotamus's tooth is much firmer in its texture than that obtained from the elephant's tusk; and, as it is covered with a hard, thick enamel, teeth may be cut from it which will, at first, very much resemble those given us by nature. There is, however, a peculiar *animation* about the natural teeth which those made from this substance do not possess. These, moreover, soon change their color, assuming first a yellow and then a dingy or dark bluish hue. They also, like those we have just mentioned, are very liable to decay. I have in my possession a number of blocks of this sort, taken from the mouths of different individuals, some of which are, in this manner, nearly half destroyed.

But there is another objection to teeth made of this article, which, even were there no other, would be sufficient to condemn its use. It is, that they, like those formed from elephant's ivory, give to the air, returned from the lungs, an insufferable odor, which cannot be corrected or prevented. They may be washed half a dozen times a day, and taken out and cleansed again at night, but it will still be grossly perceptible; and, although it may be much worse in some mouths than others, yet none will be entirely free from it.

To one, whose attention has never been directed to the subject, it would be truly astonishing to observe the effects produced upon the teeth and breath, by the wearing of two or three of these teeth. It was with much surprise that I saw them among the various arti-

ficial teeth employed by Mr. Koecker. I had before flattered myself that the time had come, when the use of a substance, that tended so much to injure the whole mouth, was not sanctioned by any scientific or respectable member of the profession. Dr. Fitch tells us that he never uses this sort of ivory for any purpose connected with the mouth; but that he often removes teeth made of it, and supplies their places, much to the satisfaction of his patients, with those made of porcelain, or taken from the human subject.*

Influenced, therefore, by the tendency of this substance to vitiate the secretions of the mouth, to produce a foul breath, and by other important considerations, I have never used it, except in the first two or three years of my practice, nor should I then have employed it had I been aware of the pernicious consequences that usually result from its use.

PORCELAIN TEETH.

The manufacture of porcelain teeth, did not for a long time promise to be of much advantage to dentistry. By the ingenuity and indefatigable exertions of a few, they have, however, within the last few years, almost entirely superseded every other kind of artificial teeth.

The French, with whom the invention of these teeth originated, encouraged their manufacture by favorable notices; and the rewards offered by many of the learn-

* Fitch on Dental Surgery, p. 412.

ed, and scientific societies of Paris,* contributed much to bring it to perfection. They were still, however, deficient in so many particulars, that they received the approbation of very few of the profession, and that only in some special cases. It is principally to American dentists, that we are indebted for that, which the French so long labored in vain to accomplish.

A want of resemblance to the other teeth, in color, transparency, and animation, was the great objection, that was urged against the porcelain; and, had it not been obviated, it would have prevented their ever being extensively employed. Until recently, all that were manufactured had a dead, opaque appearance, which rendered them easy of detection, when placed along side of the natural teeth, and gave to the mouth an inanimated and sickly aspect. But so great have been the improvements, in their manufacture, that few

* The Medical Society of Paris, regarding the manufacture of these teeth, as of great importance to the good of mankind, proposed the following questions in relation to it, and offered a medal to any one who would satisfactorily answer them.

1st Question—"Quels sont les motifs de préférence que la porcelaine mérite sur les différentes matières animales, pour la construction des dents?

2d Question—"Quels sont les moyens les plus simples et les plus économiques à employer pour composer et colorer la pâte ainsi que l'émail, et pour les cuire?

3d Question—"Le précipité pourpre de Cassius (oxide d'or précipité par le muriate d'étain) est-il préférable à toute autre substance pour colorer les gençives au besoin? Quelle est la manière de l'employer?

4th Question—"Le platine jouit-il des propriétés physiques et chimiques qui le rendent plus apte que les autres métaux, à disposer les dents de manière à pouvoir être facilement réunies entre elles après la cuisson?

5th Question—"Quels sont les moyens mécaniques, les plus avantageux pour monter les dents et les ajuster dans la bouche, sans nuire à la solidité des dents naturelles?"—*Traité de la Partie Mécanique de l'art du Chirurgien-Dentiste, par C. F. Delabarre, p. p. 111, 112.*

now can distinguish any difference between them and the natural organs. During the last four years past, I have used, almost exclusively, the teeth manufactured by Mr. Stockton, of Philadelphia, and, have no hesitation in recommending them, as superior to any that I have ever used. The ingenuity and indefatigable exertions of Mr. S. in bringing the manufacture of these teeth to such perfection, entitle him to the warmest thanks of the profession, and of the whole public. The extensive manner in which he carries on the business, enables him to furnish, at all times, teeth of every variety of shade and size.

Very beautiful teeth are also prepared by several other dentists in this country; but in order to excel in the manufacture, it is necessary to devote to it, one's whole attention. Of those who have engaged in their fabrication, not more than one in fifteen has succeeded; and many, after having spent much time and toil, have abandoned the attempt, and supplied themselves by the labors of others, with a far better article, and at a much less expense.

The porcelain teeth are now procured at so low a price, that no inducement, on the score of economy, is presented to the dentist to attempt their manufacture; and should any suppose, that he can make such as will better suit the peculiarities of certain cases, that occasionally present themselves, I fear he will meet with sad disappointment. As it is not, therefore, essential, that the practitioner of dentistry should understand the manner of making these teeth, I shall not attempt its description, but refer the reader to the treatise of Audibran, where he will find the vari-

ous articles that enter into their composition enumerated, and the method of their fabrication minutely described.

The advantages which these teeth possess, over every sort of animal substance, are numerous. They can be more nicely fitted to the mouth, and worn with greater convenience. They do not absorb its secretions, and, consequently, when proper attention is paid to their cleanliness, they do not contaminate the breath, or become, in any way, offensive. They never, or but slightly, change their color. They are not acted on by the chemical agents found in the mouth; and hence their epithet of incorruptible.

Such are the considerations that have induced me decidedly to prefer them to every other kind of artificial teeth. The objections that have been urged to their use, are, a want of congeniality between them and the mouth; their being better conductors of caloric, than bone, and, consequently, more liable to become cold, when exposed to the air, &c.; but these have so little foundation, that, if they are compared with the advantages these teeth confessedly possess, they must be regarded as unworthy of notice.

CHAPTER XX.

THE VARIOUS METHODS OF INSERTING ARTIFICIAL TEETH.

It has been already premised, that the utility of artificial teeth is, in a great measure, dependent on the manner of their insertion; we shall, therefore, proceed to notice the various, or at least the most common methods, in which this may be performed, and endeavor to point out the peculiar advantages or disadvantages of each. In determining upon the particular mode of fastening the teeth, much ingenuity and practical judgment are often necessary; yet there are certain principles which, if well understood, will enable the practitioner, in almost every variety of circumstance, so to decide, as to secure to the patient the greatest possible amount of benefit that can be derived from the operation.

Artificial teeth are inserted by means of pivots; with plates and clasps; with spiral springs; through the agency of atmospheric pressure; with ligatures; and

by transferring, or, as it is most commonly termed, transplanting a tooth from the socket of one mouth into that of another.

PIVOTING.

The pivoting or engrafting of artificial crowns to natural roots, has, on account of its simplicity, been more extensively practiced than any other method of inserting artificial teeth; and, under certain circumstances, is unquestionably the best that can be employed. If the roots, on which they are placed, be sound and healthy, and there be natural teeth in the jaws back of the artificial, so as to prevent those with which they antagonize from striking against them too hard, they will better answer the purposes of the natural organs, than artificial teeth inserted in any other manner. When they thus have a firm basis to rest on, and are properly secured, they are almost as secure as the natural teeth, and so completely may their connection with the roots be concealed, that they will have the appearance of having grown from the jaws. The incisors and cuspidati of the upper jaw are, however, the only teeth whose places can be thus supplied.

The engrafting of artificial teeth to diseased roots, or roots with diseased sockets, is followed by injurious effects that more than counterbalance any advantages that are derived from the operation. The morbid action already existing is not only aggravated by it, but also caused to extend to the contiguous parts, and

sometimes even to the whole mouth. The insertion of a tooth, immediately after having prepared the root, is also often very improper. Sufficient time should elapse for the subsidence of any irritation that this operation may have occasioned, previously to the placing of the tooth. A neglect of this precaution not unfrequently gives rise to inflammation of the periosteum of the root, and alveolar abscess.

This method of inserting artificial teeth has received the sanction of the most eminent practitioners of dentistry; and, when judiciously done, is certainly the best manner in which the loss of the upper front teeth can be supplied. On account, however, of the facility with which the operation can be performed, it is resorted to under almost every variety of circumstances, and thus a discredit has been brought upon it, that it by no means deserves.

The efforts that are made by the economy for the expulsion of the roots of the bicuspid and molar teeth, after the destruction of their lining membranes, are rarely exhibited in the case of those occupying the anterior parts of the mouth. This circumstance has led me to believe, that the roots of these teeth are endowed with a greater degree of vitality by means of their investing membranes, than the roots of those situated farther back in the mouth, and that, though the amount of the living principle, with which they are thus supplied, is inconsiderable, yet, is sufficient to prevent them from becoming obnoxious to their sockets.

The admission of this hypothesis can alone account for the fact to which we have just alluded, for it is well known that a dead root is always productive of more

or less disturbance to the surrounding parts, and that nature then immediately calls into action certain agents for its expulsion. The engrafting, therefore, of a tooth upon a completely dead root, is highly improper; but the fangs of the front teeth are rarely entirely deprived of vitality, and hence, after the destruction of their lining membranes, they often remain ten, fifteen, and sometimes twenty years, without very obviously affecting the adjacent parts.

Were the doctrines advocated by Messrs. Bew and Koecker correct, the death of a tooth would be simultaneous with the destruction of its lining membrane, and the pivoting method of fastening teeth, opposed to every correct principle of surgery. But, that the views of these gentlemen are false, any one may satisfy himself, by boring into the cavity of the root of a tooth, towards its external surface within the alveolus. Before the instrument will have passed three-fourths of the way through, the root will become so sensitive as to incontrovertibly evidence the existence of vitality. In fact, the remaining of the root in its socket, without occasioning disease, is, of itself, sufficient proof that its vascular connection with the general system still continues.

It is somewhat singular that these facts should have escaped the observation of these gentlemen; but that they have, is clearly manifest from their own remarks. Mr. Koecker tells us, that the vitality of the teeth is entirely dependent on their lining membranes, and that the destruction of these is followed by their immediate death.* Mr. Charles Bew, in treating on the circula-

* Principles of Dental Surgery, p. p. 254-'5-'6, and 427.

tion of these organs, after adverting to that of the general system, remarks: "It is just to take for granted, that through each tubified fang of the teeth, which the most sceptical observer, anatomist or not anatomist, may distinctly discern, the blood is anteriorly thrown to the interior of the tooth, and there, following a due course of beautifully organized circulation through the osseous part, is (*si interim nihil interfuerat*) quietly returned by the periosteum of the exterior." *

Dr. Fitch, in noticing the views of these gentlemen, observes, they "are both incorrect and contrary to facts, and the most correct analogical observations. We find that, in all hollow bones, of which the fangs of the teeth are a good example, that they have an external and an internal periosteum, and that the bone has an internal and an external periosteum, which, in their circulation, depend mostly upon these membranes; if the external dies, a part of the external bone dies, but no farther than the circulation depended on the dead membrane, and vice versa, when the internal periosteum is diseased or loses its vitality."† This is a pathological fact that does not admit of cavil or doubt, and, so far as the teeth are concerned, especially those in the anterior part of the mouth, may be fully verified by boring in the root, as in the manner before described.

On the death, therefore, of the internal membrane of a tooth, the crown and internal part only, of the root, dies. This necrosis, so far as the author has been able to ascertain, extends but little more than half way through the root, and in this state it often remains, not

* Bew on the Teeth, p. p. 64-75.

† Dental Surgery, part 11, p. 430.

being possessed of any powers of exfoliation, for years. So fully convinced has he been of this fact, that he has not hesitated, whenever he found a suitable root, to engraft on it an artificial crown; and the success that has attended the practice, proves the principles upon which it is founded to be correct.

The observations of Mr. John Hunter, on the vitality of the roots of teeth, although he did not believe these organs to be vascular, are doubtless true. He infers, inasmuch as the roots of teeth do not decay as readily as the crowns, that they are endowed *with greater living powers*.*

The vitality of the crowns of the teeth, being wholly derived from the lining membranes, cease, with their destruction, to possess life; but the fangs, being supplied with a living principle, from an external, as well as from an internal membrane, retain a portion of their vitality, as long as the external continues to exist, which, with those of the incisors and cuspidati, is not unfrequently for from fifteen to twenty years.

Thus it will be seen, that the death of the root of a tooth, is not simultaneous with that of its lining membrane; consequently, the objections of Mr. Koecker, based upon this supposition, to the pivoting method of inserting artificial teeth, is without foundation. We shall, therefore, conclude our remarks upon this subject, after briefly noticing one other objection, urged by the same gentleman.

“By the insertion of the pivot,” says he, “into the canal of the root, the natural curative process, in the decomposition and absorption of the fang, is either pre

* Vide Hunter on the Teeth, part 1, p. 138.

vented or retarded; while, on the other hand, the most convenient outlet for a constant and regular discharge of the matter, which is always produced by the carious root in the surrounding soft parts, is obstructed; the matter, thus confined by this artificial obstruction at the point of the root, penetrates through the sockets and gums, and forms gumboils, or small fistulous abscesses, in the neighborhood of the root.”*

This objection, though not ill founded, like the other, may, nevertheless, be obviated, by forming a groove on the side of that part of the pivot extending up into the root; an outlet will thus be afforded for the discharge of whatever matter may be formed within the canal, or at the apex of the root. This method of giving egress to the matter thus formed, was suggested to me about eight years ago, by Mr. L. S. Parmly, of New Orleans, and by adopting it, whenever I had reason to apprehend the formation of matter, I have avoided any bad consequences, which might otherwise have been produced by it.

The manner of preparing a root for the reception of an artificial tooth, will be hereafter described.

PLATES AND CLASPS.

This method of inserting artificial teeth, is, perhaps, with the exception of the one just noticed, the best that can be adopted; and, on account of its more extensive applicability, may be considered as more valuable

* Essay on Artificial Teeth, p. 142.

even than that. By this means, the loss of a single tooth, or of several teeth, in either jaw, can be supplied. A plate may be so fitted to any vacuity in the dental circle, and secured with clasps to the other teeth, as to afford a firm support to any number of artificial teeth, that may be required.

Teeth inserted on this plan, may be made to last for many years, and sometimes during the life of the person wearing them. But it is necessary to their durability, that they should be well arranged, properly fitted and secured to the plate, and that the plate itself be correctly adapted to the gums, accurately fitted to the vacuity in the circle, and properly attached to teeth that are firmly fixed in their sockets.

Gold is the only metal that should be employed for making the plates and clasps; this, for the former, should be from twenty to twenty-one carats fine, and from eighteen to nineteen for the latter. If gold of an inferior quality be used, it will be liable to be acted upon by the secretions of the mouth. The alloy employed for the plate, should be silver, and that for the clasps copper; for gold, alloyed with the latter, is harder than when alloyed with the former; and as it is necessary that that used for the clasps should be sufficiently hard, to prevent being too easily bent, the gold, from which these are made, should be alloyed with this metal. Platina would, perhaps, answer the purpose, as well as gold; but there are so few, in this country, that understand working it, that the getting of it out into plate, and such other forms, as are required, would be attended with much difficulty and inconvenience.

The plate should be thick enough to afford the necessary support to the teeth; but not so thick as to be clumsy, or inconvenient from its weight. The clasps generally require to be about one-half thicker than the plate, and sometimes double its thickness. The gold used for this purpose, is sometimes got out in the form of half-round wire; but, in the majority of cases, it is far preferable, that it should be flat; for flat clasps afford a much firmer, and more secure support to artificial teeth, than those that are half-round; they also occasion less inconvenience to the patient, and are productive of less injury to the teeth, to which they are attached.

Artificial teeth, inserted on this plan, may be worn with the greatest comfort, and can be taken out and replaced, at the pleasure of the person wearing them; which, as it is important that they should be cleaned every day, in order to prevent the saliva that gets between the plate and gum, the clasps, and the teeth that they are attached to, from becoming vitiated and injuring the health of the mouth, or tainting the breath, is a very important desideratum. Great care should, therefore, be taken to fit the clasps in such a manner as will admit of their being easily removed and replaced; and also that they may not exert any undue pressure upon the teeth to which they are fastened. If they press too hard upon them, they will occasion inflammation of their periosteum and alveolar membranes, absorption of their sockets, and perhaps eventually their entire destruction.

SPIRAL SPRINGS.

The only difference between the last noticed method of inserting artificial teeth, and the one now to be considered, consists in the manner of confining them in the mouth. That, is useful in cases where there are other teeth in the mouth, to which clasps may be attached; while this, is designed for confining whole sets, and parts of sets, when clasps, or any other means, cannot be employed.

The teeth are attached to plates in the same manner as they are when clasps are used; but instead of being fastened in the mouth to the other teeth, they are kept in their places by means of spiral springs, one on each side of the artificial denture, between it and the cheeks, passing from one jaw to the other.

Spiral springs are often required for confining only a lower set in the mouth, and sometimes for even parts of sets. When a number of teeth in the back part of the jaws are required, and, there be no teeth in the mouth to which clasps can be applied, that will afford a sufficient support, a resort to spiral springs becomes indispensable. Various other kinds of springs have been used, but none that have been tried, seem to answer the purpose as well as these. When they are of the right size, and are attached in the proper manner, they afford a very sure and convenient support. They exert a constant pressure upon the artificial apparatus,

whether the mouth be opened or closed. They do not in the least interfere with the motions of the jaw; and, although they may at first seem awkward, a person will soon become so accustomed to them, as to be almost unconscious of their presence.

ATMOSPHERIC PRESSURE.

The means that have been just described, for confining artificial teeth in the mouth, are often found inapplicable and inefficient, especially in the upper jaw, and it is in such cases that the atmospheric pressure method, is chiefly valuable. It cannot, however, well be employed for a less number than a whole upper set, because a sufficient surface of plate cannot be obtained for the atmosphere to act upon, to afford to them the necessary support, and, for a like reason, the narrowness of the inferior alveolar ridge, wholly prevents its ever being applied to the lower jaw.

The practicability of confining teeth in the mouth by this means, was formerly very much questioned; and, even at the present day, it is doubted by many. The principle, on which the plan is founded, may be simply illustrated, by taking two small blocks of smooth, flat marble, and exhausting the air from between them,—the pressure of the atmosphere on their external surfaces, will enable a person to raise the under block, by lifting the upper. In a similar manner, a gold plate, or any other substance impervious to the atmosphere, and perfectly adapted to the gum, may be made to adhere to it.

If the plate to which the teeth are attached, be of the right width, and properly fitted to the gum; and the air between it and the plate be exhausted, it will adhere with most astonishing tenacity. Persons who have had teeth confined in this manner, and by that of clasps, have informed me, that they preferred this method to that. If, however, they be so placed as not to strike the teeth of the other or lower jaw all at the same time, the plate, from being pressed only on one side, is apt to be raised on the other, and thus admit the air between it and the gum, which of course, will cause it to drop. But this, with proper care, may always be prevented.

The application of artificial teeth, on this principle, has been practiced for a long time; but the plates that were formerly used, were of ivory, instead of gold, and could not be fitted with sufficient accuracy to the mouth to exclude the air; so that, in fact, it could hardly be said, that they were retained by its pressure. The feeble retention which the teeth have to the gums, when inserted in this way, is derived from the power of adhesive attraction, and this is generally so slight, that they are constantly liable to drop. Moreover, they are so awkward and clumsy, that they cannot be worn with any kind of satisfaction; and they so readily absorb the fluids of the mouth, that, after having been worn for a few weeks, they become exceedingly offensive.

I have seen many sets of teeth that were set on plates, or rather blocks, of ivory, and many that were composed altogether of this substance; and, in one instance, prepared a set myself; but the objections above stated were so palpably manifest, that I determined

never again to attempt the insertion of artificial teeth upon this principle. Having, however, been called upon, about two years ago, by a lady whom I highly esteemed, for a set of upper teeth, and, finding that they could not be confined in the mouth by any other means, I was reluctantly induced, after having stated to her all the objections, to undertake their insertion. Instead, however, of using, as formerly, a plate carved from the ivory of the hippopotamus's tooth, I determined to employ one of gold. I accordingly had it made so as to fit all the inequalities of the gums; and after having fastened the teeth upon it, in the manner to be hereafter described, placed it in the mouth; and having exhausted the air from between it and the gums, had the satisfaction to find that it firmly adhered, and that the teeth enabled the lady, (to use her own words,) to "speak and eat with perfect ease." These teeth still continue to answer all the purposes, that can be expected from artificial teeth, under the most favorable circumstances. I have since inserted several other sets on the same principle, and with the like success; and have also seen two others, inserted by Dr. Noyes, which conferred on the persons wearing them, all the advantages that are possible to be derived from an artificial denture.

The firmness with which teeth, fastened on this principle, can be made to adhere to the gums, and the facility with which they can be removed and replaced, render them, in many respects, more desirable, than those fixed in the mouth with clasps. But, unless judgment and the proper skill be exercised in their preparation, a total failure may be expected, or, at least,

they will never be worn, with satisfaction and advantage.

Many, in attempting to insert artificial teeth in this way, have failed of success, and, in consequence, have condemned the principle, when, in reality, the fault was attributable to some defect in the preparation of the teeth, or of the fixtures, with which they were connected. Many of the failures, are owing to their premature insertion, and, however well the plate, upon which the teeth are fixed, may fit the gums at the time of its application, it will soon lose its adaptation, if it be applied previously to the absorption of the alveoli. When this happens, the air gets between the plate and gums, and the whole apparatus, as a natural consequence, drops; whereas, if a sufficient time had been allowed for the completion of those changes, that naturally follow the loss of the natural teeth, they would still continue to adhere to the gums. Another very frequent cause of failure is, a want of proper adaptation in the first instance. Unless the plate be made to fit the gums with the most perfect accuracy, the pressure of the atmosphere cannot be expected to confine it to them.

There are but few writers on this branch of dentistry, who have even so much as adverted to this mode of applying artificial teeth. Messrs. L. S. Parmly and Koecker, have each bestowed on it a passing notice. The former of these gentlemen, in alluding to the subject, thus remarks: "Where the teeth are mostly gone in both, or in either of the jaws, the method is, to form an artificial set, by first taking a mould of the risings and depressions of every point along the surface of the jaws, and then making a corresponding artificial socket

for the whole. If this be accurately fitted, it will, in most cases, retain itself sufficiently firm, by its adhesion to the gums, for every purpose of speech and mastication.*

It is not, as we have before shown, expedient to insert parts of sets upon this principle. Artificial teeth cannot, under any circumstances, be applied by means of suction to the lower jaw; for even were its alveolar ridge wide enough to admit of the application of a plate, that would present a sufficiently large surface, for the action of the atmosphere, to retain it with the requisite firmness, the saliva would prevent the air's being exhausted from between it and the gums, which we know is indispensable to its retention.

Mr. Koecker tells us, that he has "been completely successful in several instances, in the application of sets for the upper jaw in this manner;" and says, they "should be made, either with a gold plate, mounted with natural or artificial teeth, or of one piece of hippopotamus's tooth."† Having already stated the objections that exist to the use of this substance, we cannot join with Mr. K. in its recommendation. At the time when I first substituted the gold plate for it, I had not seen his late work on artificial teeth, and consequently was not aware that this had ever before been used.

* Practical Guide to the Management of the Teeth, p. p. 138—'9.

† Koecker on Artificial Teeth, p. 92.

LIGATURES.

The ligature method of fastening artificial teeth in the mouth, is, perhaps, with the one next to be considered, the most objectionable of all. It is one, which no scientific practitioner can, under any circumstances, approve. A description of it is, therefore, wholly unnecessary. But it may be well to notice some of its principal objections.

First.—Teeth cannot be fastened in the mouth with ligatures sufficiently tight, to be worn with comfort; and from their constant liability to be moved, by the least motion of the lips or tongue, are a source of constant annoyance.

Second.—In order that they may be secured in the mouth by them, the teeth must be so constructed, as to fill the whole vacuity in the dental circle; which is not always desirable; and, when the places of ten or twelve natural teeth are to be supplied, must give the apparatus a very awkward and clumsy appearance.

Third.—Teeth, when confined in the mouth, by this means, must be made of ivory, and this, as has been before shown, is unfit to be employed for this purpose.

Fourth.—They cannot so readily, as when fastened in the mouth by clasps, be taken out and replaced, and,

The fifth and great objection to these is, that the ligatures, by their constant strain, cause the natural teeth to which they are attached, to loosen, and finally to drop out. I have known this to occur in many instances;

indeed, in every one that has come to my notice, where artificial teeth, thus confined, had been worn for any considerable length of time. Dr. Fitch mentions the case of a lady, who had a central incisor inserted in this manner, which, in the course of four or five years, occasioned the loss of the other central incisor. She was then supplied with two artificial central incisors, fixed in the same manner; this produced the loss of one of the laterals; these were afterwards inserted, and the loss of the other lateral soon followed. In like manner, the vacancy was again supplied, and was soon followed by a similar result; one cuspidatus fell out, and the other was much loosened, and partially drawn from its socket. Dr. F. also gives another case, of a somewhat similar character; the subject of it was also a lady. "She had," says he, "had several sets of teeth placed in her mouth, at different times, as in the case of Mrs. A." (the subject of the case to which we have just alluded,) "and, like her, disease, probably induced or aggravated by her artificial teeth, had destroyed nearly all her back teeth, and the artificial ones had done the same for most of her front teeth, nearly as in the case of Mrs. A—; but in that of Mrs. O—," (the subject of the present case,) "the canine teeth were very firmly placed in their sockets, so as not to be readily moved by the weight of the other teeth; and the ligatures, instead of pulling them out, cut them off. At the time when her last set of artificial teeth were inserted, she had lost all of her upper teeth except the right canine tooth. The left canine tooth had been cut off by the ligatures of the set preceding these last, and to the stump of this tooth a silver screw was fast-

ened, and to this screw and the right canine tooth, the last set of artificials was fastened by ligatures. When she called on me, the ligature had cut off the right canine tooth, and the set dropt out.”*

The wearing of artificial teeth, fastened in the mouth in this manner, is almost certain to be followed by one or other of the effects described by Dr. F. If the teeth to which the artificial apparatus is secured, be too firmly fixed in their sockets, to be easily loosened, the friction of the ligatures, especially if they be wire, will, sooner or later, cut them off. Of the pernicious effects of ligatures upon sound teeth, I have known many instances. The following is one:

A lady of this city, Mrs. H—, had four upper incisor teeth fastened with ligatures, which, in a few years, occasioned the loss of the cuspidati—the teeth to which they were attached. She then had six others inserted in the same manner, and the first right bicuspid soon followed. In this way, she was supplied with set after set, until not a single tooth in the upper jaw, on the right side, remained, and only one, the second molaris, on the left,—the *dens sapientiæ* having been previously destroyed by caries. To this second molaris, a block of hippopotamus’s ivory teeth, nine in number, were confined by means of a wire ligature, which, at the time she applied to me for advice, had cut the tooth more than half off. I recommended the immediate removal of the artificial teeth, together with that of the tooth to which they were attached, and also the roots of the *dens sapientiæ*. To this, after an assurance from

* Dental Surgery, part ii, p. p. 422—’3—’4.

me, that she could be supplied with a much better set, she submitted.

That injurious effects should be thus produced, is not a matter of any surprise, when we consider, that the teeth to which the ligatures are tied, are, by the constant force exerted on them, caused to press against the sides of their sockets next the artificial teeth; and this, as a natural consequence, is followed by inflammation of their alveolar and investing membranes, and not unfrequently by disease in all the parts of the mouth.

Mr. Koecker, in speaking of teeth fastened in this manner, observes, "The injury produced by this kind of artificial teeth, is always certain; and the use of one or more teeth of this kind, is always a certain forerunner of the gradual destruction of all the natural teeth, and the consequent application of a whole double set of artificial teeth, if artificial teeth, prepared and inserted under better surgical skill, is not resorted to."

One would suppose that a practice that is fraught with so many evil consequences, and which might be so easily avoided, would not, in the present advanced state of dentistry, be adopted; but that it still exists, we have many lamentable proofs, even in our larger cities, where the art is exercised in its greatest perfection.

J. Patterson Clark, author of a popular treatise on dentistry, remarks: "So backward is the state of the art, that in London, many dentists fasten false teeth to the adjoining firm ones, by means of silk ligatures; this will, of course, keep them in their place, although dangling and loose, until those to which they are made fast, drop out, which, in general, is very soon the case."

We have dwelt upon this subject longer than we intended, but, viewing it in the light in which it is here presented, we felt that we would be very remiss in our duty, did we not at least notice some of its most prominent objections, and thus guard the student, and inexperienced practitioner, from a course that would be attended with such manifest injury to their patients.

TRANSPLANTING.

The sixth, and last method of replacing teeth, which we shall notice, is the placing of a tooth, while warm and fresh from the mouth of one person, in the socket of a tooth of the same class, previously vacated for its reception, in the mouth of another. This practice, though once quite popular, is now very seldom adopted. I have met with but one instance of the kind, and in this, the tooth never became firm, but was a constant source of irritation during the whole time that it was permitted to remain. Mr. Koecker mentions five cases of a like character, that came under his own immediate observation.

In some instances, where teeth have been thus transferred, an imperfect vascular and nervous connection with the general system has been formed; but, in order that even this may take place, it is necessary that the tooth should accurately fit the new socket, which can but very rarely occur.

So highly esteemed was this operation by Mr. Hunter, that he asserts that he has known even dead teeth to

grow, when placed and allowed to remain in foreign sockets. We can account for this palpable error of Mr. H. only by supposing that his practical observations on the teeth were not sufficient to enable him to distinguish between a living and a dead tooth.

To say nothing of the turpitude and cruelty of thus mutilating and disfiguring one person for the gratification of another, the operation itself is one which is very painful, and sometimes even dangerous. Mr. Hunter, however, denies that any danger is to be apprehended from the operation itself, and attributes the alarming symptoms, that occasionally follow it, to the deranged sympathies that are excited by the principle of irritation. The incorrectness of his opinion is, we think, fully established by the following case, given by Dr. Watson, and inserted in "The Medical Transactions of the College of Physicians:"

"An incisor tooth of the upper jaw, from an unknown cause, becoming carious, in a young unmarried lady, about twenty-one years of age, it was extracted, and its place very dextrously supplied by a like tooth from another young woman, who, upon examination for the purpose, appeared to be in good health. The scion tooth very rapidly took a firm hold, and soon bid fair to be of great service and ornament. In about a month, however, the mouth became painful, the gums inflamed, discolored, and ulcerated. The ulceration spread very fast, the gums of the upper jaw were corroded, and the alveoli left bare. Before the end of another month, the ulceration stretched outwardly under the upper lip and nose, and inwardly to the cheeks and throat, which were corroded by large,

deep, and fetid sores. The alveoli soon became carious, several of the teeth gradually dropped out, and, at length, the transplanted tooth, which had hitherto remained firm in its place.

“About this time, blotches appeared in the face, neck, and various parts of the body, several of which became painful and extensive ulcers; a considerable degree of fever, apparently hectic, was excited; a copious and fetid discharge flowed from the mouth and throat, which impeded sleep, and the soreness of the fauces prevented a sufficiency of nourishment from being swallowed.

“The wisest plan would probably have been to have commenced from the first with a mercurial process before the system was so far debilitated, and the general health so deeply encroached upon, as to render any plan of very little use. An antiseptic course, however, of bark and other tonics were first tried, and persevered in till found to be of no service whatever; and calomel pills, in an alterative proportion, were then had recourse to in their stead. This plan was found to soften every symptom, and totally to eradicate many; but the bowels were soon affected with severe pain and purging, and the calomel was exchanged for strong mercurial ointment, which, from the present debility of the patient, soon produced a like effect, and an effect that could not be corrected by opium. The venomous taint or putrescent tendency, though occasionally driven back, as often rallied, and, at length, prevailed; and the patient fell a victim to it in the greatest distress and misery. The person, from whom the tooth had been taken, had, in the mean time, continued in perfect health; and, upon a minute

inspection as well of the sexual organs as of the mouth, evinced not the slightest syphilitic affection.

“The case is mysterious, and leaves much ground for the imagination to work upon. If it be difficult to conceive it to have been syphilitic, it is more difficult to conceive it to have been any thing else. But the grand lesson to be learnt from it on the present occasion is that of the wariest caution, and a caution amounting almost to a prohibition, in remedying a deficiency of teeth by transplantation.”*

Other cases of a similar character might be adduced, but this, we think, especially when we consider the apparent healthiness of the individual from whom the tooth was taken, is sufficient to show the danger with which the practice is attended.

* Quoted from Good's Study of Medicine, vol. 1, p. p. 75-'6.

CHAPTER XXI.

MANNER OF PREPARING A NATURAL ROOT AND INSERTING A PIVOT TOOTH; ALSO, THE VARIOUS OTHER METHODS OF INSERTING ARTIFICIAL TEETH.

BEFORE we proceed to prepare a root for the reception of an artificial crown, the mouth, if affected with any other disease than that which rendered the operation necessary, should be restored to health. Such portions of the decayed crown, as may remain, should then be removed by means of an oval or half round file and excising forceps. If the tooth is not much decayed about its neck, it should be cut about half off, with the file, before the forceps are applied, otherwise the excision of the crown will produce a violent concussion of the root, and thereby cause its membranes to become inflamed.

If the nerve be alive, it must, after the excision of the crown, be immediately destroyed. For this purpose, a small, sharp pointed instrument should be introduced as far up into the canal of the root as it may be desirable for the pivot, by which the crown of the

new tooth is to be retained, to extend, and then turned quickly backwards and forwards several times. This instrument ought to be made of silver or iron, so that it may not be liable to be broken by the patient suddenly moving his head. Some prefer a hot wire, but that is far more liable to irritate the root.

After the nerve has been destroyed, the balance of the operation will be unattended with pain. The root may then be filed off close to the gum, with a file such as we have before described. In the next place, the cavity of the root must be enlarged, for the reception of the pivot. This enlargement should be effected by means of a drill.

After we have thus prepared the root, we should wait from four to eight days before we insert the tooth, in order to allow time for the subsiding of any irritation that may have been thus occasioned. Dr. Fitch, recommends the use of lead pivots, this he thinks, has a tendency to prevent the supervention of inflammation. Whether these pivots possess this virtue I am unprepared to say, having never used them except in one or two instances, where indeed there was no inflammation, but it, in fact, scarcely ever, in any case, manifests itself, unless the tooth be inserted too soon.

If all unnecessary mechanical violence is avoided, and the inserting of the tooth be delayed as before directed, and an outlet be made in the pivot, for the escape of such matter as may be formed about the apex of the root, no danger from inflammation and swelling need be apprehended. In those cases, where the lining membrane is dead, and there is only a low degree of vitality sustained by the external or investing membrane, greater

ground exists for fear; than in those cases where it still continues alive.

Having waited long enough for the irritation to subside, we may proceed to fit the artificial crown to the root, which should be done as accurately as possible. The base of the crown should touch every part of the extremity of the root so that it may rest steadily and firmly upon it, and the tooth at the same time be in an exact line with the circle of the other teeth. The practice of closely fitting it, anteriorly, to the root, and leaving, posteriorly, a large space between the two, as is often done, should be carefully avoided; for any aperture between the crown and root affords a lodgement for extraneous matter, and the tooth itself is more readily loosened than it otherwise would be. Care should also be taken to prevent the false tooth from crowding the adjoining teeth, or on the closing of the mouth, from falling improperly on those of the lower jaw. For, if it presses against the other teeth, it will be very apt to irritate and inflame the periosteums of their roots; and if it come in collision with the lower teeth, it will be loosened and thrown out of its proper place.

The cavity in the root, and that in the artificial crown, intended to be engrafted to it, should be directly opposite to each other, else the latter will not fit to the former in the proper manner. When the crowns of natural teeth are used, the proper place for the pivot hole, is indicated by their internal cavity; but, when the porcelain are used, if great care has not been taken in their manufacture, considerable difficulty may be experienced in their insertion.

There is some little diversity of opinion, as to the

kinds of pivots that should be used. Some prefer those made of wood; others, those of metal. Dr. Fitch, on this subject, observes: "The metallic pivots are far better than any other; and their only objection is, that they are apt to wear the tooth, that is placed upon them, and the stump in which they are inserted; and so much so do they have this effect, that we are induced to use pivots of wood. This last has the advantage, if perfectly seasoned, of swelling in the stump, by the moisture which they absorb; and, in this way, become very firm. The advantages and disadvantages, of the two kinds, are, perhaps, nearly balanced."

To the use of wood pivots, however, Mr. Koecker is decidedly opposed. "The pivots," says he, "should be made only of fine gold or platina; every other metal, such as brass, copper, silver, and even inferior gold, are highly objectionable, being more or less liable to corrode, and thus become injurious to the other teeth, and the general health. There is, however, a practice, which is still more improper, namely, the use of pivots made of wood: these pivots, after insertion, considerably expand, from the moisture of the mouth, and consequently remain perfectly firm in the roots for several years, which deceive not only the patient, but the dentist also, and induces them to consider the case very successful, until they at last find that the root is either split by the great swelling of the pivot, or nearly destroyed by the rapid decay of the wood in the cavity, which, by its chemical and mechanical irritation, is very apt to produce very serious inflammation, and other affections of the gums and sockets; and, not the least objection, the

disagreeable breath, which must be unavoidably concomitant of this practice."

Again, on the insertion of pivoted teeth, Mr. K. in another place, adds: "I have made it an universal rule to insert the tooth in such a manner, that the patient should be capable, after receiving the necessary instructions, to remove it, and replace it, at pleasure; for this purpose, I have found it best, and most effectual, to wind a little cotton round the pivot, which should be filed somewhat rough previous to its insertion into the fang."

The description here given of the effects arising from the use of a pivot of wood; is, perhaps, somewhat exaggerated. If it be inserted with proper care and judgment, it is no more likely to produce irritation, and to affect the breath, than a gold one, wrapped with cotton, or one made of any other metal. The fact that wood pivots remain firmly in the root for several years, ought rather to be considered as a recommendation, than an objection; and with me, I must confess, it would go far towards determining my preference in their favor; for observation has taught me, that the frequent removing and replacing of a pivoted tooth, greatly tends to hasten the destruction of the root, and to affect the surrounding parts with disease. A wood pivot, however, should never be so large, that the swelling of it would occasion the splitting of the root. It must, therefore, be of such a size, as will admit of its insertion, without employing any violent means.

The pivots that I have been in the habit of using, and which I prefer to all others, consist of gold, incased in thin layers of wood. They are made in the

following manner:—the gold is first formed into wire of the proper size, and passed through a screw plate. On one side of it a small groove is cut with a thin edged oval file. A hole, the size of the wire, is then drilled lengthwise in the wood, and as far as may be required. Into this the wire is first screwed, and then cut off close to the wood, which, at the end, is whittled down to the size of the cavity in the artificial crown, and firmly pressed into it. The wood, at the termination of the wire, in the next place, is trimmed to suit the cavity in the root, and that part of it which covers the groove in the gold wire, is removed with the point of a sharp knife blade.

This kind of pivot, I conceive to be, in many respects, preferable to any other. The wood prevents the gold from enlarging the cavity of the root, or that of the artificial tooth; and, at the same time, by the swelling of the wood, the pivot is firmly retained in both. The gold keeps the artificial tooth from being moved, as often happens, when a wood pivot alone is used, after it becomes saturated, and softened with the juices of the mouth. The groove in the side of the pivot, by furnishing an outlet for any matter that may be formed about the apex of the root, prevents the deleterious consequences, that might ensue from its accumulation.

The gold employed for the pivots should be eighteen carats fine, and the wood which I have found best suited to the purpose, is firm, close-grained, and well seasoned hickory.

The cavity in the root should be cleansed from all extraneous matter, previously to the insertion of the tooth. This is necessary, in order to prevent the drill-

ings of the root from coming down and closing the groove on the side of the pivot, and that any morbid humors, that may form in the canal of the root, or at its apex, may have free egress to the mouth. Another groove, in continuation of the former, should be made between the false tooth and the root. This should be on the lateral or posterior side of the root, and cut on it, or the tooth, before the insertion of the pivot.

That part of the pivot which is to be inserted into the root, should never be so large as to require to be driven up with a hammer. This is often done; but the practice is a bad one, and is generally followed by inflammation and suppuration of the lining and investing membranes; and, from the effects of which, the parts seldom recover. No more force, for this purpose, should, therefore, be used, than can be exerted with the hand.

The artificial crown should be first fitted to the root with a temporary pivot, of soft wood, in order the more readily to ascertain in what manner the permanent one should be shaped, so as to make the tooth fit, and also to avoid the necessity of removing the tooth after it has been once firmly inserted.

THE MANNER OF PREPARING TEETH FOR INSERTION WITH PLATES AND CLASPS.

In the preparation of this description of artificial teeth, it is necessary to have a model of the parts, to which the plate and clasps are to be fitted. The manner of obtaining this, therefore, will first engage our attention.

THE MANNER OF OBTAINING A MODEL.

The obtaining of a model of the alveolar ridge, or ridges, when one for each jaw is required, though apparently very easy, is nevertheless often attended with some difficulty; or, at least, the obtaining of one of the exact shape of the parts intended to be represented; nor can it, without some experience, or a knowledge of the obstacles that occasionally present themselves, always be accomplished. Without this, it will be impossible to fit the apparatus, to which the artificial teeth are to be attached, to the gum and the teeth that it is to be fastened to, in a proper manner. The importance, therefore, of having a correct model must be obvious, and to obtain which the following is the proper procedure.

In the first place, an impress of the gum and remaining teeth of the jaw in which artificial ones are required, is to be obtained by pressing upon them a piece of yellow or white wax, previously softened in warm water or by a fire. An exact impression of the gums where the teeth have been lost, and of the teeth that remain, will, if proper care be taken, be thus obtained. This is next to be filled with a paste made of calcined plaster of paris—gypsum. When the plaster becomes hard, the wax should be softened by a fire and removed; when a correct model of the parts will remain.

Simple as these processes may seem, considerable tact and practice is required to go through with them

correctly. In order to obtain a correct impression, great care is requisite in the application and removal of the wax. The pressure on it should be sufficiently great to force it into all the inequalities and depressions of the gums and teeth; and this should be uniformly applied on every part at the same time, otherwise the wax will spread, and the impression be more or less imperfect. The greatest danger, however, to be apprehended, is, in the removing of it from the mouth; and, when it is necessary to have an impression of the back part of the alveolar ridge, it cannot be done without altering its shape, unless the wax shall have been previously placed in a frame prepared for the purpose. Every dentist should supply himself with several of these frames, made to correspond to the circle of the dental arch, and suited to the different widths of the jaws of different individuals.

The plaster used for filling the wax impressions, should be first well calcined, and passed through a fine sieve. A paste may then be formed by mixing it with water. This, at first, should not be thicker than thin batter, but after the indentations of the teeth in the wax have been filled, it may be thickened by adding a little more plaster; when the rest of the impression should be filled with it, and that the model may not be easily broken, it would be well to raise the plaster about half or three quarters of an inch above the wax.

When a double set of teeth is required, or when the number to be supplied is so great that they cannot readily be made to meet the ones with which they are to antagonize, double, or, as they are most commonly

called, articulating models, should be obtained. These, when correctly taken, will exhibit the exact manner in which the jaws come together, so that, by their aid, we are enabled properly to antagonize any number of teeth.

Models of this kind are obtained by taking a wax impression of both jaws at the same time. The frame, however, in which the wax is placed, should have rims on each side, about half an inch in width. The person, of whose mouth an impression of this kind is to be taken, should be directed to close his jaws gently on the wax, until they approach as near to each other as they should do when filled with teeth. Thus, an impression of both jaws will be had in one piece of wax, but only one of these should be filled with the plaster at a time; and in filling the first, the plaster should be extended back of the wax at least one inch, and raised fully that much above it. After this shall have become hard, a smooth surface should be formed on the part that extends back of the wax on the side facing the impression yet to be filled. Across this surface, a deep groove should be formed. This done, the remaining impression should be filled, in a manner similar to the first, extending the paste back upon the plaster surface just formed, so that, on the removal of the wax, which should be done as soon as this shall have become hard, a perfect model of both jaws, representing the manner in which they come together, will remain.

When a double set of teeth is required, separate models should also be taken; for those, of which we have just been speaking, serve only to regulate the arrange-

ment and length of the teeth; and cannot, in any manner, be employed for adapting the plates.

The plaster models, although very firm and hard, are not sufficiently so to admit of the gold plates being worked upon them to the shape they are required; therefore, other and harder ones will be needed, which are made in the following manner:

With the plaster model, an impression is made in sand, such as is used in iron and brass founderies, and then filled with some fused metal, such, for instance, as brass; or, what perhaps is equally as good and much more convenient, on account of its being more easily fused, a mixture of zinc and tin. When the metal has become cold, all that part of it, which does not represent the form of the gums and teeth, should be buried in sand, and the other encircled with a rim of copper or brass, of an inch or an inch and a half in width. Upon the projecting part of the model, melted lead or tin is next to be poured, which, when it becomes cold, may be removed. In this way, a mould or impression, like that of the wax, is had, between which and the model previously formed, a plate may be stamped to fit the gums in the most perfect manner.

It is never necessary to have metallic articulating models, the plaster is sufficiently hard to answer all the purposes for which they are required.

MANNER OF FORMING AND FITTING A PLATE.

The usefulness of teeth inserted with plates and clasps—the comfort and ease with which they are worn, together with the health of the gums on which they

rest, and of that of all the contiguous parts, depend, in a great measure, on the proper adaptation of the the plate. If this be imperfect, they, so far from being an advantage to the wearer, usually become a source of disease to the whole, or a great part of the mouth; and hence the importance of rightly forming, and properly fitting the plate.

When there is only one vacuity in the dental circle, to be supplied, and this not very considerable in its extent, but little difficulty will be experienced; but when there are two or three, or only one, and that very large, it will be found more troublesome.

The size of the vacant spaces left by the teeth, should be first ascertained by means of a piece of paste-board moistened in water, or of thick sheet lead. Whichever of these articles is used for this purpose, should be allowed to extend from the alveolar ridge, about one-half, or five-eighths of an inch, towards the interior of the mouth, and towards the exterior, just far enough to cover the anterior edge of the gum. When there is more than one vacuity, the paste-board, or lead, whichever is used, should be cut to fit closely around the intervening teeth. The shape and size of the lead, or paste-board, is next to be marked, with a sharp pointed instrument, upon a piece of gold plate, prepared for the purpose.

The size and shape of the plate required, having been thus ascertained, it is cut, and then stamped between a metallic impression and model, obtained in the manner before described. It must, however, be previously well annealed; and if, after having been once

stamped, it does not fit the model well, it should be re-annealed, and stamped until it does fit.

It often happens that the plate, in being stamped, is drawn from the teeth at the sides of the vacuity; or, when there are more vacuities than one, from those that are between. In such a case, pieces of gold should be soldered on to it, until it be made to fit up to the teeth; for it is essential, that, in this particular, the greatest accuracy should be observed; otherwise, the gum by the sides of the teeth, which is there generally more prominent than any where else, will be liable to be irritated by the edges of the plate, and thus will be continually kept in a state of morbid excitement.

The fitting of these pieces of gold to the plate, and confining them there until they are soldered, is a nice and not unfrequently a very difficult matter. A little practice, however, will enable a person possessing the least mechanical tact, to do it without much trouble. The pieces should be first fitted to the edges of the plate, where they are required, and then confined to it by means of small iron clamps or fine iron wire. Sometimes the wire should be preferred and at other times, the clamps, the preference in every case being determined by its own peculiarities. After this, the pieces must be soldered to the plate in the manner hereafter to be described; and it again fitted to the model.

The vacant spaces between the teeth and plate are sometimes such, that several pieces of gold are required to be soldered to it before it will fit. When this happens, the process is very tedious, frequently requiring a half or three quarters of a day's labor for the adaptation of a

plate perhaps not more than large enough for four or five teeth.

Where there are more vacuities than one, small strips or bands of gold should be soldered on to the edges of the plates and made to pass around the intervening teeth on their interior sides. These bands should fit up closely to the teeth, and that they may not annoy the tongue, they should be nicely beveled from the plate to the teeth. Though this custom of putting collars around the teeth is very seldom followed, yet it is of very great advantage; it strengthens the plate and affords a much firmer support to the false teeth than they otherwise would possess. A plate fixed in this manner, rests much more easily upon the gums, and if the collars be properly fitted, its liability to injure the intervening teeth is effectually prevented. It moreover, has a neatness and finish which it cannot by any other means be made to possess.

The pressure of the plate upon the gums should be as great on one part as on another, for if it is not, those parts upon which it presses the hardest, will be liable to be irritated, especially if they be immediately under its edges.

In those cases where the destruction of the gums and alveolar processes is such that very long artificial teeth are required, the ends of them that come in contact with the plate, will have to be thrown so far back in order to meet it, that the teeth themselves will project and have a disagreeable appearance. To prevent this, the plate should be raised in the mouth, by soldering a gold plate to its anterior, and another to its posterior edge; and then making the plate, fastened to the posterior

edge, incline forward so as to meet and be fastened to the one soldered on the anterior; and thus form a sort of close prismatic box, which should be perfectly tight, in order to prevent the admission of the secretions of the mouth.

A plate may, in this manner, be raised without materially augmenting its weight, but were a solid piece of gold to be employed, it would, aside from the expense, be so heavy that it could not be worn with any thing like comfort or convenience.

The practice that is usually pursued in those cases where a thick basis is required for the false teeth to rest upon, is to form one of an entire block of ivory. But such a gold one as has just been described, is much better, because, as we have before shown, ivory is very injurious to the mouth. I have, in many instances, removed teeth placed on an ivory basis; and have always found that the gold plate here described, was capable of conferring more ease and giving more general satisfaction; than that which was removed, had ever done.

MANNER OF FORMING CLASPS—ATTACHING THEM TO THE PLATE, AND FITTING THEM TO THE TEETH.

We have already spoken of the importance of the clasps being properly applied, and we would further observe, that the utility of the artificials is no less dependant on it, than on the adaptation and fit of the plate. For, it is of but little consequence how well the plate may suit; if the clasps, by which it is retained, be

improperly applied to the teeth, which they encompass. In such a case, the false teeth can never be worn with comfort, and the injurious influence exercised by them upon a part, if not the whole of the mouth, will nearly or quite counterbalance any advantage that can be derived from their employment.

To determine on the most suitable manner of forming the clasps—of attaching them to the plate, and applying them to the teeth, sometimes requires no little amount of sound judgment and practical experience. In cutting the plate, a strip of gold is often left on each end of its inner side, long enough to go around the teeth, to which the apparatus is designed to cling. These strips are bent round the model teeth, previously to the stamping of the plate, so that they, by this process, at once receive their proper shape. This mode of forming the clasps, however, is objectionable. The gold, of which the plate should be constructed, is of too fine a quality for the clasps; and they, moreover, in most cases, require to be thicker than the plate, and attached to it in a manner different from what they would be if formed according to the method here described.

Clasps used for the retention of teeth in the upper jaw, are generally required to be much stronger than those which are employed for the same purpose in the lower, and even for the support of the same number of teeth in the same jaw; the amount of strength required is not always the same, but varies according to the peculiar circumstances connected with each particular case. Sometimes they must be from an eighth to a fifth of an inch wide, while at others the

width of a sixteenth is all that is requisite. When six or more teeth are to be inserted, the clasps should be of sufficient width and strength to prevent the teeth from moving; and in general, the wider the clasps the better, provided, they can be conveniently applied.

A clasp should never, if possible, be applied to an incisor or cuspidatus. When only a single incisor tooth is to be inserted, the clasps should be carried back to the bicuspid, for then they will be made to act in a horizontal rather than a vertical direction, and will consequently be less liable to loosen the teeth, to which they are to be attached than they would be if applied to the adjoining ones.

In extending the clasps or strips of gold back to the teeth, to which they are to be fastened, it sometimes answers best to have them so fitted as to lie flat on the gums, and at other times to lie snugly up to the teeth. When they are intended to retain only two or three teeth in the upper jaw, the former is the preferable mode, but when they are intended to retain teeth in the lower jaw, or a large number in the upper, or in fact any number that may be liable to injury from the under teeth, so the latter mode of applying them is decidedly the best. In determining, however, these points of preference, the practitioner must be governed by the peculiarities of the case, but whatever mode be adopted, care must be taken that the clasps do not press too hard upon the gums, and thus produce irritation.

Although in the insertion of one or two artificial teeth in the front part of the mouth, it is generally better to have the clasps extend to the bicuspid; yet there are cases in which they can, with greater advantage

be fastened to the adjoining teeth. In the lower jaw this often occurs. In such cases the clasps should be small, fitted with the greatest precision, and allowed to go no farther round the teeth than is absolutely requisite.

The manner of attaching the clasps to the plate, depends upon the manner in which they are intended to be applied to the teeth. When they are to rest upon the gum back of the teeth, they should be soldered as far back on the plate as possible; but when they are to sit close up to the teeth, on each side of the vacuity, their ends should be so attached to the plate, as to fit close up to those adjoining it. The points at which the clasps should touch the plate, are to be ascertained by trial, and marked upon it, before they are soldered, and in settling and marking these points, great care and accuracy are necessary, else the apparatus will sit loosely in the mouth, and be liable to be easily moved.

In applying artificial incisors to the lower jaw, it sometimes becomes necessary to solder to each end of the plate, a small piece of gold, from an eighth to a quarter of an inch in length; which should be fitted close up to the teeth on each side of the gap, and to the upper ends of these, the clasps are to be fastened. These, however, are requisite only in those cases, where, from the great absorption of the alveolar processes of the lost teeth, the clasps, were they to be directly attached to the plate, would be likely to injure the gums, around the teeth, which it would be necessary for them to encompass.

It sometimes happens that the teeth to which the clasps are to be applied, incline so much backward,

that the clasps, when properly bent, cannot be put over them without difficulty. If this cannot be obviated in any other way, the teeth should be filed; for it is highly important that the clasps should be so fixed that they may be easily removed and replaced, in order that the apparatus may be frequently cleansed.

The frame to which the teeth are to be attached, having been thus prepared, the next business is to select the teeth, arrange them on the model, and then fit and connect them to the plate. As porcelain teeth are at present the most highly prized, especially for insertion on plate, we shall first describe the manner of mounting them, and then proceed to notice the mode of fastening human teeth. These are the only two sorts of teeth whose use we approve, and consequently the only two, whose mode of insertion will hereafter engage our attention.

MANNER OF ARRANGING PORCELAIN TEETH ON A MODEL.

Every dentist employing these teeth should be provided with a collection embracing every shade, color, and size, that he may be able, in every case, to select such as are of the proper hue and right dimensions. Of these qualities, however, it is more important to have a variety of color. The size, unless it be too small, can be altered as occasion requires; and although this alteration will more or less impair the beauty of the teeth, yet even then they will be much better, than when there is a difference of color between them and the natural organs; for in this case, a contrast is formed,

which seldom fails to attract observation, and this to the wearer of them is always disagreeable.

The same order should be followed in the arrangement of the artificial teeth as is observed in that of the natural. This rule should always be followed, when the loss of those in the anterior part of the mouth are to be supplied; but when the bicuspid are to be replaced, its observation is not of so much importance. When these latter teeth have been lost in the upper jaw, those immediately under them often become so elongated, that they almost, and sometimes quite, touch the gums in the vacuity. In such cases, were artificial teeth to be applied, shaped like those that had been lost, the lower bicuspid would so strike against them that the other teeth would be entirely prevented from closing on each other. This difficulty, however, may be prevented, by substituting, for the bicuspid, very thin cuspidati, whose external appearance is nearly the same as the bicuspid, while at the same time, their thinness is such, that, if they be set pretty well out on the external ridge of the jaw, they will rarely hinder the coming together of the other teeth, by knocking against the lower bicuspid.

In order accurately to fit and arrange the teeth on the model, the vacant spaces corresponding to the deficiencies to be supplied in the mouth, should be filled with softened wax, which should extend so far forward as to form a line with the circle of the teeth. In this manner we are enabled to retain the artificials in their proper places on the model, as those that are suitable are respectively selected, until the whole deficiency is supplied.

In selecting the teeth, a strict regard should be had

not only to their form and color, but also to the manner of their fitting the gums. This last, however, is of but comparatively little importance; for if they are in other respects suitable, they may be ground on a sharp gritted stone, until they do fit. This is very often required, and every mechanical dentist should be provided with a small grindstone, especially designed for the purpose.

When an articulating model becomes necessary, the teeth, with the wax to which they are attached, should be transferred to it, from the single model, or models, on which they have been previously arranged. Thus the exact manner of the coming together of the upper and lower teeth will be seen; and such alterations may then be made in the adjustment of the artificials, as the circumstances of the case may require. This is the only sure way in which artificial teeth can be made to antagonize with those against which they are to strike. For the insertion of a small number, however, an articulating model is seldom necessary; but when ten or twelve, or a whole upper set, are to be inserted, it becomes indispensably requisite.

MANNER OF ATTACHING THE TEETH TO THE PLATE.

Teeth that are intended to be fastened by means of a plate, are shaped differently from those that are to be inserted with a pivot. Instead of having a broad base, they terminate almost in a point. Their poste-

rior surfaces are flat and smooth, and on them small platina pins are fixed, to which the gold that is to attach them to the plate, is to be fastened. Teeth that are made in this country, rarely have more than two of these pins in a tooth; but those that are manufactured in France, usually have three. The French porcelain teeth, however, more commonly have a small perpendicular groove cut on the back of each, with small bits of platina fixed on its sides, generally, one piece on one side, and two on the other. By either of these means, plates of gold may be securely attached to the teeth; the pins alone, however, are generally found to afford a more convenient mode of attachment, than the grooves.

In connecting the teeth with the plates, the first thing to be done, as has just been intimated, is to attach small pieces of gold to their posterior surfaces. This is effected in the following manner:

The teeth having been selected, and fitted on the model, in the manner before described, pieces of gold large enough to cover the posterior surfaces of those to which they are to be attached, and thick enough to give them the necessary support, should next be prepared. Upon each of these plates, the relative situation of the pins on each particular tooth must be marked; and holes, the size of the pins, and at the proper points, must be either drilled or punched through them. These holes should be enlarged on the sides of the plates that are not to touch the surfaces of the teeth. The plates are then to be placed on the teeth, and the pins riveted, and thus the possibility of their removal, unless the pins break, or be drawn from the teeth, is effectually precluded.

The pins, instead of being riveted, are sometimes soldered to the plate. This mode of fastening them is, however, much less secure than the other; and, moreover, the additional heat to which the teeth are, in consequence, subjected, often causes them to crack.

The small plates on the inner sides of the teeth, should now be accurately fitted to the large plate, that is to confine them in the mouth, which should lie upon the model in the same manner, that it will upon the gums when placed in the mouth. The extremities of the teeth should be made to project far enough over its outer edge, to touch the gums, so as effectually to conceal the gold from view. As the teeth are fitted to the plate, they should be retained in their places with wax, in the manner before described.

The gold plate, teeth, and wax, should then be carefully removed from the model, and placed upon a piece of charcoal; but in moving them, we should be exceedingly careful, not to disturb the teeth, for if they be moved from the places, to which they have been fixed, on the plate, they will sit badly in the mouth. After having placed them on the charcoal, a thin paste of calcined plaster of paris and water, should be poured around them, until their anterior surfaces and ends are completely covered. When the paste becomes hard, the wax on the inside must be removed, and the plaster on the outside trimmed down to about the thickness of a quarter of an inch. Thus, by means of the plaster, we are enabled to keep the teeth in their proper position until they are soldered to the plate. No more of it, however, should be used, than is absolutely necessary, for the greater the quantity employed, the greater

will be the heat required for soldering them to the plate.

If, on removing the wax, it should be found that the gold on any of the teeth does not come down tight and close to the plate, it should be made to do so, by fitting small pieces of the same metal between it and the plate, wherever necessity requires. A small quantity of borax should now be triturated with water, on a smooth stone, or piece of glass, until it attains the consistence of cream, when it must be applied to those parts of the plate, on which the gold from the teeth rests, and also to such other places as may require soldering. At every point where the borax has been placed, three or four pieces of royal solder should also be added.*

The whole mass should next be heated to a red heat, by means of the flame of a lamp, thrown upon it with a blow-pipe. The flame must then be brought to a small focus on the solder, that is to unite the gold of a single tooth to the plate; as soon as this shall be seen to run, it must be passed from that to another, and then to another, in continued succession, until the whole process is completed.

* In putting together an apparatus of this sort, if solder inferior to royal be used, it will be liable to be destroyed by the secretions of the mouth. The royal is composed of two parts of pure gold, two of silver, and four of copper. There is another kind of a finer quality than this, consisting of six parts of pure gold, four of silver, and two of copper; which I employ for soldering clasps to the plate, and for all other purposes, except the soldering of teeth to the plate, for which, on account of its being extremely difficult to fuse, is objectionable. The freeness with which solder runs, depends very much on the manner in which its ingredients are proportioned.

Although soldering, in itself considered, is a very simple operation, yet it cannot be performed with facility by one without experience, especially when it becomes necessary to heat as large a mass as is formed by ten or a dozen teeth, and the plaster required to keep them in their proper places. The heat should be steadily applied at first by a large flaring flame, and then by one concentrated in the manner just described; and it should never be entirely withdrawn, for in that case it would be necessary again to heat the whole mass, which would endanger the cracking of the teeth.

In soldering teeth, much depends upon having a suitable lamp. The spirit lamp, on account of the small quantity of smoke emitted by it in burning, is decidedly preferable to any other that can be employed. The wick should be tolerably thick, and extend one or two inches out of the vessel that contains the alcohol.

After the teeth are soldered to the plate, they should be placed in a mixture composed of one part sulphuric acid, and six parts water, until the borax, that was previously put on them, and which, by the heat, has now become almost as hard as glass, is decomposed. This process the jewellers usually term pickeling, and when it has been completed, the acid should be washed from the teeth, and the plate, clasps, and the gold on the teeth made perfectly smooth, by such instruments as are usually employed by silversmiths, and jewellers, for similar purposes.

In the application of the teeth to the mouth, such alterations should be made in the clasps, as the teeth to which they are to be fastened may require, and in order to guard against similar alterations in the plate,

it would be well always to try how it fits in the mouth, previously to attaching the teeth to it.

There are two methods of fastening grooved teeth to the plate, the first is simply to place a piece of gold wire in the groove, and solder first to the platina on each side, and then to the plate. This, however, is a very imperfect and insecure mode of fastening them, and much inferior to the other, which consists in fixing a wire in the groove, as above described, and then filing it down even with the tooth, and soldering it to a piece of gold, which must afterwards be attached to the plate in the manner we have already noticed. This piece of gold should be as wide as the tooth, and fitted closely up to it.

By means of the plate and clasps, artificial teeth can often be securely fixed in the mouth, when there are but two teeth remaining in the jaw, and sometimes, even when there is only one, provided, that there also be at the same time a root, which is sound and firmly fixed in its socket. In this case a gold pivot must be fastened to the plate, and inserted in the cavity of the root, but a plate should never be thus fastened, when it can be secured at each end with a clasp.

MANNER OF ATTACHING NATURAL TEETH TO A PLATE.

Natural teeth may be mounted by preparing the plate and clasps in the same manner as those for porcelain; and then securing the crowns, either by

means of screws, or else by two rivets placed in each tooth. The rivets are always to be preferred.

They may be also secured in the following manner: A gold plate is to be made of the size of the space intended to be supplied with teeth, and about an eighth or sixth of an inch in width. To the inner circle of this, the flat side of a half round gold wire must be soldered, each end of it extending far enough back to form a clasp around the tooth to which it is intended to be attached. The teeth are next to be selected and fitted on the model, and then with a saw, of the thickness of the plate, a horizontal groove is cut across their posterior surfaces, so that the plate may be let into them up to the wire, which is afterwards to be made fast by means of rivets, two in each tooth. This done, all that remains is to fit the ends of the wire up close to the teeth, on each side of the vacuity, and around the ones they are designed to encompass.

This method of mounting natural teeth is not so good as the one first noticed; yet if it be properly done, and the mouth in which they are placed be healthy, they for a few years will answer tolerably well. Teeth inserted in this manner, however, seldom endure very long, because the groove into which the plate is set, receives and retains the juices of the mouth, and thus causes them to corrode the teeth. When these teeth are mounted in the manner as first described, the secretions of the mouth, it is true, get between them and the plate, but then only one surface is exposed to their action; whereas, those that are inserted in this manner, present three surfaces to this corrosive influ-

ence, namely, that which rests upon the gum, and also one on each side of the plate.

There is also another consideration, which should lead us to give our preference to the mode first mentioned: it is when the teeth are inserted in that manner, the gum is usually pressed upon by a broad, well adapted plate, whereas, when they are fastened in the way we are at present considering, the gum is pressed upon only by the ends of the teeth, which, being comparatively sharp, are liable to produce irritation.

CHAPTER XXII.

MANNER OF PREPARING TEETH WITH SPIRAL SPRINGS.

BOTH jaws are often, to a certain extent, supplied with teeth without the aid of spiral springs; but it is only when the springs are employed, (whether any natural teeth remain or not,) that the sets are denominated double. Spiral springs, however, may be required for securing a single set, or a set for a single jaw. But this can rarely happen, except for the fastening of sets for the lower, since those for the upper, can generally, or always be confined in a more convenient manner.

In the preparation of a double set, the plate for the upper jaw should be made about five-eighths of an inch wide; the width of the lower must be regulated by the height and width of the alveolar ridge for which it is designed.

The alveolar ridge of the lower jaw, is, in some instances so much absorbed as to be scarcely perceptible, and is covered over with the integuments of the lower

part of the mouth, lying in loose folds upon it. The utility of false teeth, especially as regards mastication, can never, under such circumstances, be very great. The moving about of the teeth, which, on account of the narrowness of the ridge, it is impossible wholly to prevent, and the pressure upon the loose integuments always produce irritation; so that the teeth, instead of contributing to the comfort of the wearer, are a source of almost constant annoyance. It would, therefore, be better, in cases of this kind, wholly to dispense with their use. Should, however, an individual whose mouth is thus circumstanced, still persist, after he has been apprised of the true state of the case, in desiring the insertion of teeth, we should endeavor, as much as possible, to obviate the difficulty, by making the plate very narrow, and rounding its under edges. But when the plate is very narrow, it should be made thick, in order that it may not be easily bent.

Teeth that are to be inserted with springs, must be arranged, mounted, and antagonized, and have their plates fitted and adapted, in the same manner, as those that are to be fastened with clasps.

Fastenings, for the springs, however, must be attached to the plate before we solder the teeth, these are sometimes fixed at the ends of the plate, but the proper place for them is on the sides, between the bicuspids and molars; for when the springs are fastened here, they keep the teeth much more firmly in their places, than when fixed at the ends of the plate. These fastenings consist of small studs of gold, each about the sixth of an inch in length, soldered upon the plates near their outer edges, and on a line with the outer surfaces of the teeth

having a gold pivot or pin, about the thickness of a fine knitting needle, and an eighth of an inch in length, projecting at right angles, from the outer side of each, towards the cheeks, with a small screw and nut on its end.

The springs are formed either by winding a piece of gold wire upon a small round spindle, or by wrapping it upon another piece of wire of the proper size, made fast in a vice. The former, however, is the better mode of making them. After the gold wire has been wound in this manner, the spindle is drawn from it, and the coil that remains, cut to the proper length. Another piece of gold wire having a flat head, with a hole rather larger than the pins attached to the studs, and being of the thickness of the spindle, and about half an inch in length, is next to be inserted in each end of the coil, so as to form a kind of eyelet or swivel.

The springs are then attached to the upper and lower plates, which being thus connected, are placed in the mouth, and held in their proper places by the action of the springs.

The wire used for the construction of the springs, should be no thicker than is absolutely necessary to give to them the requisite power; and the diameter of the coil should never exceed the eighth or seventh of an inch. Their length must be regulated by the peculiarities of the mouth. In some cases they will have to be much longer than others; the usual length, however, is about an inch and a quarter, but in some instances I have found it necessary to make them an inch and three quarters.

When a single set is to be confined in the mouth in this manner, fastenings for the springs at one end, are to be attached to one of the natural teeth, on each side in

the other jaw. These sometimes consist of gold caps placed on the teeth, and furnished with a pivot or pin, fixed on each of their outer sides, like those before described. When caps are employed, the artificial teeth, which are to antagonize those upon which they are placed should be shorter than any of the others. Gold bands are in some cases substituted, with advantage for the caps.

MANNER OF PREPARING TEETH TO BE INSERTED UPON
THE SUCTION, OR ATMOSPHERIC PRESSURE PRINCIPLE.

The only difference that there is in the preparation of a set of teeth, to be applied on this principle, and those that are confined in the mouth with spiral springs, consists in the construction of their plates. The plate for the former, should be much wider than that for the latter, for the tenacity with which it adheres to the gums, depends much on the breadth of surface it presents to the action of the atmosphere. Hence a model obtained for the construction of such a set, should represent more of the roof of the mouth, than is required for the formation of a set, which is to be retained in the mouth by any other means. The plate should be made of virgin gold, and wide enough to cover, not only the alveolar ridge, but also a portion of the roof of the mouth.

On applying the teeth to the mouth, the person by whom they are to be worn, should be directed to suck the air from between the plate and gums, which will

at once cause it to adhere; and if the apparatus has been properly prepared, they will ever after be worn without the least annoyance.

CONCLUSION.

Having now treated of the various surgical and mechanical operations, connected with the Dental Art, I will proceed to offer a few remarks on the order in which they should be performed; for upon its due observance, the attainment of the advantages to be derived from them, will, in a great measure, depend.

If the mouth is involved in a complication of diseases, and the curative indications be neglected, it will be of but little consequence how well a single operation may be mechanically performed. When a tooth is decayed, the gums around it turgid and spongy, and no means are employed to restore them to health, the mere plugging of the tooth will be of no avail; for, as diseased gums cause the teeth to become loose, and drop out, the destruction of the tooth will be almost as certainly effected, as if no means had been used for its preservation. Nor would our efforts be attended with greater success, were they to be directed to the restoration of the gums alone; for then the caries would still be progressing, and would ultimately occasion the loss of the tooth. It would be equally useless to attempt the preservation of a tooth that was decaying

in two separate places, by operating on one of them, without also, at the same time, attending to the other.

In short, the treatment must be thorough, and persisted in, until both the teeth and gums are restored to health. The judicious practitioner will, therefore, consider well the remedies indicated by the diseases of each, and observe that order in their application, which promises not only relief to one, but the most permanent cure to both.

The operator is sometimes prevented by his patients from pursuing the course of treatment his better informed judgment dictates. In cases of this kind, he should distinctly inform them of the treatment proper to be adopted; and if then they are unwilling to submit to it, he should decline rendering any services whatever. This he ought to do, in justice not only to himself and patients, but more especially to the professional body of which he is a member, and which has suffered so much from obloquy heaped upon it, on account of ill advised and badly conducted operations.

It is not only necessary that all the operations required should be performed, but that they be performed at the proper times; otherwise, the benefit that is to be derived from each, will be lost, and, in some cases, the mouth be left in even a worse condition than it was before.

The practice of extracting, cleansing, plugging, and inserting teeth, at one and the same sitting, especially when the gums are spongy and inflamed, is often productive of much mischief, and cannot be too severely censured. Whenever, therefore, all these operations

are required, the following order should be observed in their performance.

First.—Extraction and cleansing should precede all other operations. For the completion of the latter process, several sittings are often required. It may, however, in such cases, be commenced at the first sitting, either before or after extraction, and carried as far as circumstances will admit; and then be resumed, at intervals of three or four days, until it is completed. But we should not, in the mean time, neglect to adopt such medical and surgical treatment, as may be necessary to the restoration of the gums to health.

Second.—After the gums have become healthy, such of the remaining teeth as are decaying, should next demand our care.

Third.—The gums and teeth having been restored to health, we may proceed to supply, with artificial teeth, such losses of the natural organs, as may be required.

Instances, it is true, do sometimes occur, where the performance of these operations at the same time, would be perfectly proper; but then there are many more, where it would be extremely injudicious. The following case may, perhaps, serve to illustrate the consequences, that may generally be expected to follow too hastily conducted operations on the teeth and gums.

In the spring of 1834, Mr. —, of N. Carolina, accompanied by his daughter, called on me, with a request that I would examine her teeth, and perform such operations on them, as might be required. Upon an examination of her mouth, I found several of her teeth were so much decayed, that their restoration to

health seemed impracticable, and nearly all of them were coated with tartar, which, around many, extended down to the alveolar processes. Her gums were swollen and inflamed, and the crowns of the upper incisors so much decayed, as to require artificial teeth to be substituted in their place.

Under these circumstances, I informed her father that it would require two weeks, at the least, to complete such treatment as was necessary to the health of her teeth and gums. He, however, was obliged to leave the city in two days, and therefore requested me to proceed as far with it as I could in that space of time; but as the insertion of the teeth seemed to be a paramount consideration with the young lady, I wholly declined rendering my services. They, therefore, left me; the father with a determination not to have any thing done to her teeth, until an opportunity should offer to have them properly treated; and she, with her desire for the insertion of the artificial teeth, but little or not at all diminished. Accordingly she prevailed on him to call with her on another dentist, who not only inserted the incisors, but also plugged several of her teeth, and pretended to remove the tartar, which perhaps he did, as far as it was possible, at only a single sitting.

In May, 1835, the same gentleman again called on me with his daughter, whose mouth was now in a much worse condition, than when I first examined it. The hasty manner in which her upper front teeth had been inserted, gave rise to the formation of three alveolar abscesses, from which an almost constant discharge of matter had since continued. Finding the extraction of

the roots, upon which the artificial teeth had been placed, was necessary, I accordingly removed them; and, in the performance of such other operations as were required, observed the order which has been just recommended; and in about five weeks had the satisfaction of seeing the health of her mouth entirely restored. The loss of the front teeth, however, was not repaired until the following fall, she not being able to remain in the city a sufficient length of time to allow the alveolar processes to be entirely absorbed.

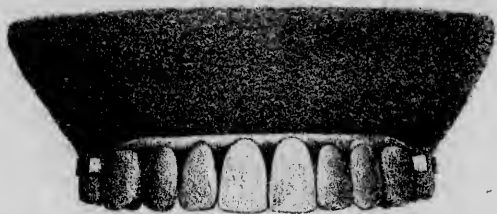
I have not selected this case because of any peculiarity it possesses, not in common with others; but simply because I would impress on the mind of the young practitioner the importance of not performing too many operations at a time.

P L A T E I.

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- FIG. 1, Represents eight porcelain teeth mounted on a gold plate, and the clasps by which they are to be retained in the mouth. The vacuity, which this apparatus is intended to fill, was originally occupied by ten teeth, namely, four incisors, two cuspidati, and four bicuspidates; but, in consequence of the contraction of the arch after their loss, eight artificials only were required to fill it.
- FIG. 2, Represents a plaster model of the upper jaw of the mouth, in which the teeth (fig. 1) is designated to be placed, with the teeth attached to it. The plate, in this case, was permitted to cover more of the anterior part of the alveolar ridge, than is usually advisable for it to do.
- FIG. 3, Represents a plaster model of the alveolar ridge of the upper jaw, together with a part of the roof of the mouth.
- FIG. 4, Represents a set of porcelain teeth, fourteen in number, mounted on a gold plate, previously fitted to the mode (fig. 3,) to be inserted upon the atmospheric pressure principle.

PL. I.

2.



3.



4.



P L A T E II.

-
- FIG. 1, Represents a side view of a porcelain molar tooth, and also a piece of gold that is to be fastened to it by means of the platina pins, for its attachment to the plate.
- FIG. 2, Represents a side view of a porcelain upper central incisor tooth.
- FIG. 3, Represents a spiral spring, with its eyelets or swivels, one partially inserted, and the other entirely out, by which it is to be attached to the teeth, that it is intended to assist in supporting.
- FIG's 4, 5, Represent an upper and lower set of porcelain teeth, mounted on gold plates, together with the pins on the sides, to which the spiral springs are to be attached.
- FIG. 6, Represents a posterior view of an upper set of porcelain teeth, mounted on a gold plate.
- FIG. 7, Represents the sets of teeth, (fig's 4, 5,) connected together with spiral springs.

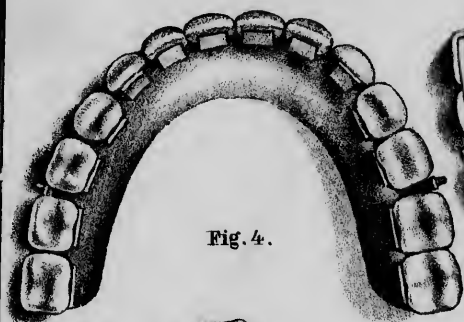


Fig. 4.

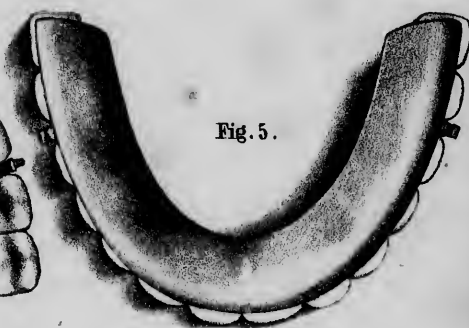


Fig. 5.



Fig. 1.

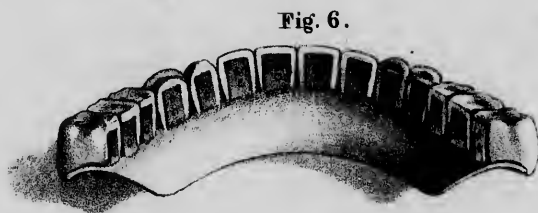


Fig. 6.



Fig. 2.

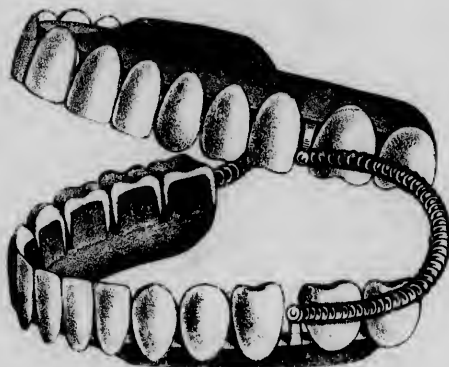


Fig. 7.



Fig. 3.

P L A T E I I I .

FIG. 1, Represents the alveolar ridge of a lower jaw, with the eight anterior teeth remaining.

FIG. 2, Represents six porcelain teeth, mounted on a gold plate, designed for the jaw, the alveolar ridge of which is exhibited in fig 1.

FIG. 3, Represents an anterior view of an upper set of porcelain teeth, mounted on a gold plate.

FIG. 4, Represents the apparatuses, fig's 2 and 3, connected together with spiral springs, in the mouth of the person for whom fig. 2 was designed.





Fig. 1.

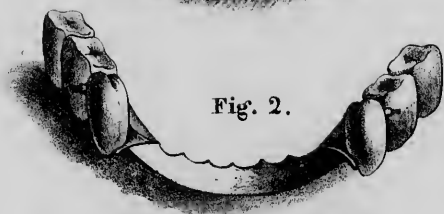


Fig. 2.

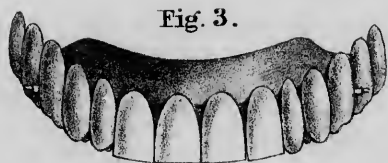


Fig. 3.

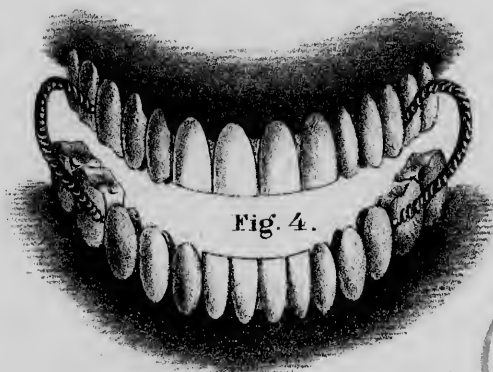


Fig. 4.

